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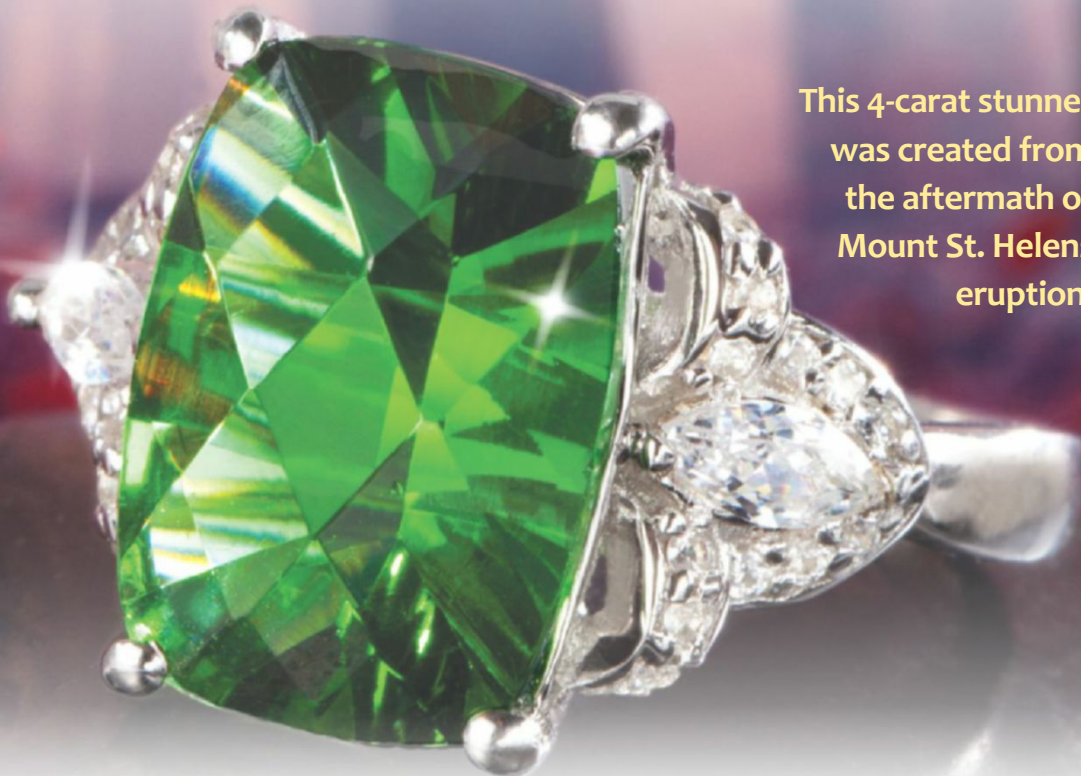
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THE ROLE OF RITUAL

Everyone has rituals, some of them mundane and personal, such as brushing your teeth or getting on the same bus at the same time every day to go home from work. Some center on family, like using the pumpkin pie recipe each Thanksgiving that was handed down by your mother. Others focus on faith, such as celebrating an important religious occasion by attending services conducted in much the same way as they have been for hundreds, if not thousands, of years. Some rituals celebrate your home country, like Fourth of July fireworks. If you're a baseball fan, you've no doubt seen players perform very personalized rituals—tapping their feet a certain number of times in the batter's box, adjusting their batting gloves before they step up to the plate, or pointing at the sky to thank God or to acknowledge a lost loved one after throwing a final blazing strike to end the game. All these rituals, repeated over and over with absolute precision, serve to organize our lives, to honor our ancestors, faiths, history, and country, and to ensure or celebrate our successes.



In ancient cultures, rituals were also an integral part of people's lives. It is not surprising, then, that many of the stories we share with you in *ARCHAEOLOGY* concern how and why rituals were performed in the distant and not-so-distant past. In this issue, you will read about how such diverse peoples as the Maya in Guatemala ("Magnetic Mesoamericans") and the Tiwanaku, whose territory included much of the land surrounding Lake Titicaca in Bolivia ("Sacred Rites of an Early Andean Empire"), used rituals to control the people they governed. The Paiute, Ute, and Shoshone Indians of the North American Great Basin ("The Prayerstone Hypothesis") communicated with their ancestors and the divine by placing prayerstones in the landscape. And, for at least two officers involved in the Battle of Peleliu, one of World War II's most vicious engagements, a ritual accompanied the end of their lives. After a pitiless two-month fight to defend this small Micronesian island ("Place of the Loyal Samurai"), the Japanese forces were defeated, after which a pair of commanders committed ritual suicide, a sacred rite that had been practiced by Japan's warriors since antiquity.

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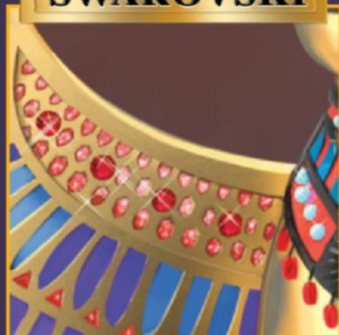
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FROM THE PRESIDENT

THE MALTESE WAY OF LIFE

Water not only sustains us, it also brings us together—travel by boat has always been easier and less costly than overland transit. I was reminded of the importance of maritime journeys during a recent visit to Malta. These small rocky islands to the south of Sicily lie in the middle of the Mediterranean Sea, which, throughout history, has connected peoples living on and beyond its shores. For at least 7,000 years, many of these peoples passed through Malta, among them Greeks, Romans,



Grand Harbor, Valletta, Malta

Muslims, Sicilians, Normans, Spanish, French, and British. Acts 28 recounts that the apostle Paul, who came from the city of Tarsus in Asia Minor (modern Turkey), spent time in Malta in the first century after being shipwrecked while on his way to Rome. Of particular interest to me is Malta's early colonization by the Phoenicians, a Semitic people who lived on the coast of modern-day Lebanon and controlled much of the maritime trade in the Mediterranean during the first millennium.

The many peoples who traveled through Malta left a lasting imprint on the main island's landscape, culture, and population, from prehistoric megalithic temples to Phoenician tombs, from Roman baths to the medieval fortifications of the Grand Harbor in the main city of Valletta. In some ways, Malta's appearance reminds me of Jerusalem's Old City, where I have conducted much of my research. In both places, the densely packed buildings, usually no more than two stories high, are constructed of the local yellow stone. The sound of Maltese—a Semitic language related to Arabic, which perhaps preserves Phoenician elements but is written using the Latin alphabet—is also familiar to my ears. And yet, Catholicism is the state religion, English is the second language, and vehicles drive on the left side of the road, some of the legacies of centuries of European influence and colonization. Malta's rich and unique cultural heritage would not be possible without its location at the heart of the Mediterranean Sea, which has connected travelers and traders for millennia.

Jodi Magness

President, Archaeological Institute of America

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FROM OUR READERS

BUZZ BUZZ

What species of native bees were kept by the Maya ("Maya Beekeepers," May/June 2019)?

Linda Valder
Tucson, AZ

Eric A. Powell replies:

The Maya kept stingless honey-producing bees of the species *Melipona beecheii* and *Melipona yucatanica*. Both are native to Central America and are now endangered.

GETTING YOUR BEARINGS

Thank you so much not only for the fascinating article about maps through the ages ("Mapping the Past," May/June 2019) but for the maps now included with each article referring to specific locations. It's often a good thing to know where you are!

Cheryl M. English
Wayne County, MI

LIGHTING THE WAY

I am a long-time subscriber and especially enjoy the articles about the Egyptian and Maya cultures. One of the many questions I have concerns the paintings in the tombs of the Valley of the Kings in Egypt ("Inside

King Tut's Tomb," May/June 2019). In 2011, I visited three tombs, including Tutankhamun's, which we accessed by climbing down flights of stairs well lit with strings of incandescent light bulbs. Each chamber was lit with low-beam lights.

I asked our guide how the artists painted these delicate scenes with so much detail without the availability of natural light. She said there were a few theories, one of which was the use of torches burning animal fat and salt to reduce the amount of smoke, or copper sheets to reflect the sunlight. I would appreciate any solution to this question. Please continue to produce this outstanding, informative publication.

Robert P. Paige, Jr.
Granbury, TX

Egyptologist Kara Cooney replies:

Artificial light would have been absolutely necessary once the workers had progressed more than 30 feet or so into a given tomb, and there is ample evidence for what kind of lighting they used. Archaeologists have found many written requests for old linen to make lamp wicks, as well as for pottery bowl lamps and oil to burn. We suspect that only long-term use of lamps would have left significant traces of soot, and since these spaces were decorated within the span of months to a few years, there was probably not enough time for such depositions of carbon to accumulate.

The theory that the ancient Egyptians used polished copper plates to reflect sunlight into tombs is unrealistic and there is

no evidence to support it. Copper would have been prohibitively expensive and more in demand for workers' tools.

CARPET MODEL

The very interesting article on the Lindisfarne monastery in the most recent *ARCHAEOLOGY* ("Medieval England's Power Monastery," May/June 2019) stimulated my further interest. The "carpet pages" that divide the Gospels in the famous Lindisfarne edition are described as being "modeled after prayer rugs." This left me wondering what prayer rug tradition this refers to. Given the dates, it seems a very short but conceivable period of time for the Islamic prayer rug tradition to have established itself and made its way from Arabia to Northumbria. Was there an existing Christian or pre-Islamic prayer rug tradition that provided a model?

John Ronayne
Boston, MA

Medievalist Michelle Brown replies:

My research has shown that Bede, in early eighth-century Northumbria, was certainly familiar with an *ordo* (church ritual) for the use of a prayer mat (*oratorio*) during the veneration of the Cross on Good Friday north of the Alps. Such mats were used in some of the early churches of the Near East, and would appear to have subsequently influenced liturgical prayer practices in Western Europe and in early Islam.

ARCHAEOLOGY welcomes mail from readers. Please address your comments to *ARCHAEOLOGY*, 36-36 33rd Street, Long Island City, NY 11106, fax 718-472-3051, or e-mail letters@archaeology.org. The editors reserve the right to edit submitted material. Volume precludes our acknowledging individual letters.



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YOU SAY WHAT YOU EAT

Try saying “f” and “v” and pay close attention to your lower lip and upper teeth. Would it surprise you to learn that these sounds are relatively recent additions to human languages? Languages, of course, develop over time as usage, meaning, and pronunciation change. But what about the ways our bodies have changed over the millennia? Could this also contribute to changes in language? In a new study, researchers from the Max Planck Institute for the Science of Human History and the University of Zurich have used evidence from paleoanthropology, speech biomechanics, ethnography, and historical linguistics to determine that, in fact, it is a combination of factors—both cultural and biological—that produces changes in language and has contributed to the diversity of languages that exist today.

In the Neolithic period, starting about 10,000 years ago, when the lifestyle of people in Europe and Asia changed dramatically as a result of the large-scale adoption of farming in place of hunting and gathering, their biology changed, too. Prior to this shift, the consumption of gritty, fibrous foods such as nuts and seeds, staples of the pre-Neolithic diet, put a great deal of force on children’s growing mandibles and wore down their molars. In response to the biomechanical stress of chewing these tough foods, people’s jawbones grew larger and larger over their lifetimes, and their molars drifted toward the front of the mouth, eliminating their childhood overbites. With the development of farming, easily chewable foods such as processed dairy products and milled grains were introduced into people’s diets. As the prevalence of these foods increased, people began to retain their childhood overbites well into adulthood.

In the 1980s, a linguist named Charles Hockett proposed that this physical change helped lead to a change in the sorts of sounds included in languages, but his theory gained little traction. The current team, led by linguists Damián Blasi and Steven Moran, set out to test Hockett’s theory. They anticipated finding that he had been incorrect. The team used computer models of jaws and teeth exhibiting different bite patterns to investigate the linguistic consequences of the move



Edge-to-edge bite,
Upper Paleolithic skull,
Arene Candide Cave, Italy

to a diet of softer foods. Specifically, they wanted to test the implications of an extended overbite against the pre-Neolithic edge-to-edge bite. “I think that we largely use this idealized notion of humans as coming with a fixed, uniform biological profile, which is a reasonable starting point,” Blasi says. “But the copious evidence for human adaptation at the biological level to different diets, behaviors, and ecologies needs to be considered more seriously if we want to have an integral view of the factors shaping the structure of languages.”

Blasi, Moran, and their team demonstrated, to their surprise, that how a person’s teeth align can lead to significant differences in the sounds they tend to make. Most importantly for their study, they showed that people with retained overbites could more easily articulate a range of consonants called labiodentals—produced when the lower lip comes into contact with the upper teeth. Examples of labiodentals include “f” and “v.” An overbite, they found, enables people to make these sounds with 29 percent less muscular effort than doing so with an edge-to-edge bite. At the same time, an overbite makes it harder to produce bilabials, such as “b” and “p,” which require the lips to be pressed together. As a result, these sounds frequently

FROM THE TRENCHES

morphed into labiodentals. The addition of the labiodentals contributed, in turn, to the proliferation of languages after the Neolithic, so much so that thousands of years later, these speech sounds are present in 76 percent of the several hundred extant languages of the Indo-European family. These include most of the languages of modern Europe, as well as many of Asia.

The researchers then examined modern languages and found that hunter-gatherer languages, such as those found in parts of northwestern Australia,

Greenland, and southern Africa, use only one-fourth as many labiodentals as the languages of agricultural or farming societies. “Our new research suggests that a biological perspective is indeed necessary to resolve why languages have the range of sounds they have,” says Moran. Taken together, these lines of evidence paint a compelling picture of language diversification being tied to diet.

What humans eat has had profound impacts on our biological and cultural history for thousands of years, and will certainly continue to do so. “I think the

results from this study show that when it comes to the debate of ‘Are humans still evolving?’ the answer is clearly yes,” says archaeologist Suzanne Pilaar Birch of the University of Georgia. “[Language] is yet another relatively recent example that corresponds to the deep and multifaceted influences of the development of an agricultural lifestyle on humanity. We are only just beginning to understand how complex and intertwined these sociobiological impacts are.”

—LYDIA PYNE

OFF THE GRID

MERV, TURKMENISTAN

Over many centuries, a settlement on an oasis along the Silk Road grew into one of the world’s great metropolises. Ancient Merv was a nexus of commercial goods, languages, ideas, and religious beliefs connecting Europe, Africa, and the Far East. The site was first settled in the fifth century B.C. by the Achaemenids, whose empire stretched from the Caucasus to Egypt. Their settlement, Erk Kala, was succeeded by Gyaur Kala, which was built by Greek Seleucids under Antiochus I (r. 281–261 B.C.). Over the next millennium, Merv became a major economic and political center for a succession of empires. By the eighth century A.D., the Islamic Abbasid Caliphate had established Merv as their eastern capital. They called it Sultan Kala and turned it into one of the world’s largest urban centers. In the late Middle Ages, maritime trade gradually supplanted the traditional land routes of the Silk Road, and Merv began a slow decline. The city was devastated by a Mongol attack in 1221, a blow from which it never really recovered.

Virtually all the material dating to the Erk Kala and early Gyaur Kala periods is buried up to 60 feet under the surface. “Realistically, with our attention to modern stratigraphic excavation, the time needed for such a deep excavation—even if the health and safety issues could be overcome—would make it very difficult to undertake,” explains Tim Williams, director of University College London’s Ancient Merv Project. However, researchers have used aerial photography to capture the entire site, particularly the remains of the medieval city of Sultan Kala. Says Williams, “It’s enabled us to understand the layout of the city, down to the detail of individual houses and buildings, in a way that a surface survey could never do.”

THE SITE

Visiting Turkmenistan requires advance planning, and travelers are encouraged to sign up with one of the international tour groups leading trips to Merv. Before you travel to the site, Williams recommends a visit to the national museum in

the capital, Ashgabat, for an overview of the history of the region, and to the museum in Mary, the nearest city to Merv, which houses artifacts uncovered at the site. In addition to ruins of fortifications dating to the Erk Kala and Gyaur Kala periods, visitors will see the remains of im-

pressive medieval earthen buildings called *koshks*. The largest of these, the Great Kyz Kala, lies just outside Sultan Kala’s western wall, and was likely built between the eighth and the ninth centuries as a fortified palace.

WHILE YOU’RE THERE

Take a day trip out to the site of the Parthian city of Nisa, which

Great Kyz Kala, Merv, Turkmenistan



was occupied from roughly the third century B.C. to the third century A.D. Continue your immersion in the past by booking a tour to ride the famous Turkmen horses in the foothills of Kopet Dag, the breathtaking mountain range that separates Turkmenistan and Iran.

—MARLEY BROWN



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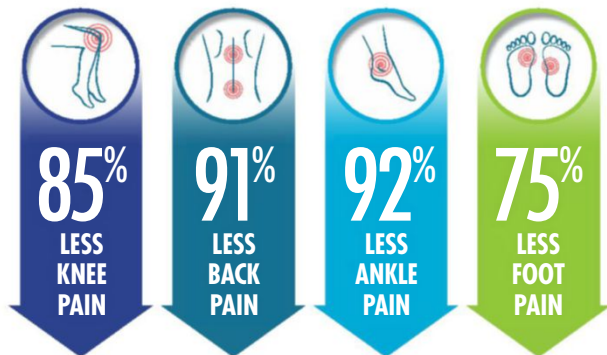
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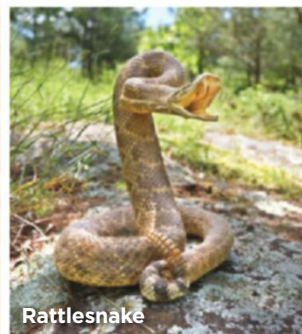
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FROM THE TRENCHES

SNAKE SNACK



Rock art depicting a serpent



Rattlesnake

Some 1,500 years ago, a hunter-gatherer in the canyon lands of the Lower Pecos region of southwest Texas made the unfathomable decision to gulp down a whole snake, fangs and all. Texas A&M University archaeologist Elanor Sonderman discovered evidence for this queasy-making culinary event while studying a human coprolite, or desiccated feces, that was excavated in the 1960s at the site of Conejo Shelter. While examining the coprolite, which

Snake fang



contained the expected plant remains, Sonderman found a fang, as well as scales and bones, belonging to a venomous snake—either a copperhead or a rattlesnake.

Other coprolites from the area show that people did, occasionally, eat snakes at the time, but only after dressing and cooking them. The bones in this case showed no signs that the reptile had been prepped. Rather, the adventurous gourmand probably ingested the creature with-

out first defanging or descaling it. “It’s possible someone was curious and looked at a snake and said, ‘I will put that in my mouth,’” says Sonderman, “but it’s not likely.” She points out that serpentine figures are often depicted in rock art of the Lower Pecos, suggesting that snakes were important symbolically. It’s possible that consumption of the snake was an element of a ritual, likely undertaken by someone with an uncommonly strong stomach.

—ERIC A. POWELL

A FUNERAL FIT FOR ETRUSCANS

The discovery of a fourth-century B.C. Etruscan burial in Aleria, on Corsica, has yielded new details of the pre-Roman culture’s funerary practices. While excavating hundreds of graves dating from the third century B.C. through

the third century A.D. in a Roman necropolis on the island’s eastern side, archaeologists from France’s National Institute of Preventive Archaeological Research (INRAP) found stairs descending to a long corridor and a hypogeum—a rock-cut underground burial chamber normally reserved for high-status individuals—predating the Roman burials. More than 100 tombs of this type were excavated in the 1970s and 1980s at Casabianda, another Etruscan cemetery just to the south.

Sealed shut by clay, rocks, charcoal, and pieces of pottery, the intact tomb contained a skeleton surrounded by collapsed ceremonial furniture, a mirror, and various drinking vessels. “This discovery allows us to understand the internal arrangement of the burial,” says INRAP archaeologist Catherine Rigeade. She explains that there are likely other contemporaneous burials at the site, which would provide additional evidence for an ongoing Etruscan presence on Corsica prior to the Roman conquest of the island in 259 B.C.

—BENJAMIN LEONARD



Tomb, Aleria, Corsica



Grave goods

HISTORY IN THE DNA

An early nineteenth-century clay pipestem, one of many unearthed in the slave quarters at the former Belvoir tobacco plantation on Maryland's Chesapeake Bay, has allowed archaeologists to rescue a lost history. DNA yielded by the seemingly unremarkable artifact has enabled them to determine that the pipe was used by a woman closely related to the Mende people of present-day Sierra Leone. This is a new way to connect an individual to an artifact she once used, says Julie Schablitsky, project director and chief archaeologist with the Maryland Department of Transportation. "You have this small, common object, and all of sudden this new world opens up and there is a whole person behind it," she says. "It starts to take us back to the beginning, back

to West Africa, where her story began."

The ability to find such stories is vital to descendants of enslaved people hungry for information about their families' pasts, especially in the absence of manumission records, wills, or possessions. "The descendants ask me, 'Can you connect me to this space? Can you say that my ancestors were here?'" says Schablitsky. "It's so hard to learn anything personal about these enslaved people, but information about gender and place of origin such as we learned from the pipestem provides a kind of personal validation for their descendants. It allows them to say, 'We survived.'"

—JARRETT A. LOBELL



Clay pipestems

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A PLOT OF THEIR OWN



Harappan couple burial, Northern India

At a 4,500-year-old necropolis in northern India, archaeologists discovered a grave containing the remains of a man and a woman who seem to have been buried at the same time. The burial is one of some 60 graves that have been recently unearthed near a settlement known today as Rakhigarhi. Rakhigarhi was one of the largest cities of the Indus Valley, or Harappan, civilization, which flourished from 2600 to 1900 B.C. in what is now Pakistan and northern India. The couple were interred in a pit along with ceramic vessels and an agate bead. “The skeletal remains of both individuals were well preserved,” says Deccan College archaeologist Vasant Shinde, who led the excavations. “The manner in which they were buried, with the male facing toward the female, could commemorate their lasting affection, even after death.” Analysis of the skeletons showed that the two were between 21 and 35 years old when they died. They are the only known Harappan couple to have been buried together in the same grave.

—GURVINDER SINGH

PICNIC FOR THE AFTERLIFE

You might have seen a delicacy known as “century eggs” on Chinese restaurant menus or on the shelves of Asian markets and wondered, “Are those eggs really 100 years old?” (Answer: They aren’t. It actually only takes about a month to make them, using a pickling liquid made from lye, salt, and water, and then rolling the eggs in mud and wrapping them in rice husks.) In a recently excavated tomb in eastern China’s Jiangsu province, however, archaeologists found a jar filled with eggs dating all the way back to the Spring and Autumn Period (770–ca. 475 B.C.), making these incredible edibles at least 2,500 years old. Sadly, only the shells remain.

—JARRETT A. LOBELL



Pottery vessels and eggs

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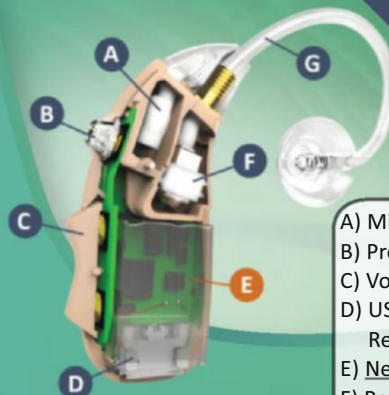


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FROM THE TRENCHES

A BIG PRODUCTION

When contractor Pedro Archila drove his excavator into a large earthen mound outside the central Guatemalan city of Coban in May 2018, he inadvertently exposed the remains of the largest figurine workshop ever discovered in the Maya world. A team led by archaeologist Brent Woodfill of Winthrop University and Erin Sears of the Smithsonian Institution subsequently excavated the site, called Aragon, and are now analyzing its more than 400 fragments of figurines and figurine molds.

The workshop appears to have been active between A.D. 750 and 900, suggesting that a community of artists thrived in the area even as nearby cities, including Cancun some 50 miles to the north, declined or were destroyed during a period of turmoil. The figurines were likely used as diplomatic gifts and trade items, says Woodfill, and may help scholars learn more about the political landscape in the region at the end of the Maya Classic period (ca. A.D. 250–900). “We don’t know very much about the Classic period and the beginnings of the Postclassic period in this area,” he says. “Now that we’ve identified this figurine workshop, it shows that there was a significant population here that was heavily involved with trade and exchange.”

—MARLEY BROWN



Ceramic mold



Ceramic mold

PUTTING DINNER ON THE TABLE

Around A.D. 400, archaeologists believe, children from the indigenous Caribbean Saladoid culture on the island of St. Thomas helped their mothers put food on the table by foraging. The researchers have found that a midden in downtown Charlotte Amalie contains thousands of mollusk shells, the majority of which are smaller snails that adults wouldn’t have bothered to collect because of their low meat yield. Rather, these smaller animals were gathered by Saladoid children, who scoured shallow areas along the shore. “Children made it possible to exploit a wider area more efficiently,” says archaeologist William Keegan of the Florida Museum of Natural History. They could fill a whole basket with small whelks, he explains, and still easily carry it back to their village.

Such aid was necessary because Saladoid communities were matrilineal, so men lived primarily in their mothers’ villages rather than with their wives and children. This made women responsible for providing most of the food for their families, says

Frog carved from shell



Mollusk shells



Keegan. They would supplement produce from their gardens with shellfish, collected in part by the helping hands of their children.

—BENJAMIN LEONARD

MEDIEVAL BABY BOOTIE

A leather fragment of a late fourteenth-century child's shoe was recovered during rescue excavations beneath the cobbled streets of Saint-Ursanne, Switzerland. Preserved in waterlogged soil, the ankle boot likely belonged to a child of about one year old, and would have been fastened with leather button clasps. Although the shoe's style was common for the period, says Marquita Volken of the Lausanne Shoe Museum, its decorative technique is very rare. The intricate geometric and foliage patterns were created by scraping away the leather grain to form a suede-like surface, rather than punching or stamping the designs, as was usual. "Such a pretty little shoe for a baby probably meant the same as it would today," says Volken. "We want our children to look cute—even if the shoes aren't needed for walking."

—BENJAMIN LEONARD



Leather
baby boot

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Key Marco Cat photo courtesy Department of Anthropology, Smithsonian Institution (A240913)

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COTTON MILL, PRISON, MAIN STREET

Remnants of the foundation of a former cotton mill that later served as the main barracks for a Confederate prison in Salisbury, North Carolina, were unearthed during a recent excavation. The prison, which opened in late 1861, was known as a relatively pleasant spot in its early years, with recreational activities including baseball games that may have matched prisoners against guards. By late 1864, however, its prisoner population had swelled to 10,000—four times the number the entire complex was designed to hold. Many prisoners took up residence in the yard, where they dug sleeping holes and, in some cases, escape tunnels. Thousands died of disease or were gunned down by guards in response to uprisings.

The prison was abandoned near the end of the Civil War, and Union troops destroyed its buildings, whose bricks were later harvested, sold, and used to construct many of the structures that now line Salisbury's Main Street.

In an empty lot owned by the Historic Salisbury Foundation, archaeologists led by Timothy Roberts, project director for Cultural Resource Analysts, found bits of rubble, mortar, and brick left behind by these harvesters. "We're seeing almost the ghost of the building," says Roberts. Nevertheless, he was still able to trace the outline of its foundation. The team found a range of artifacts, mostly

dating to after the war, including glass medicine bottles from a local drugstore known as Kluttz's, and glass liquor bottles. One item that may have belonged to a prisoner is a piece of bone with a copper pin in it. Roberts believes it was part of the case of the type of folding knife prisoners used to dig their sleeping holes and escape tunnels.

—DANIEL WEISS



19th-century lithograph showing a baseball game, Confederate prison, Salisbury, North Carolina



Glass liniment bottle



Glass medicine bottle



Glass whiskey bottle

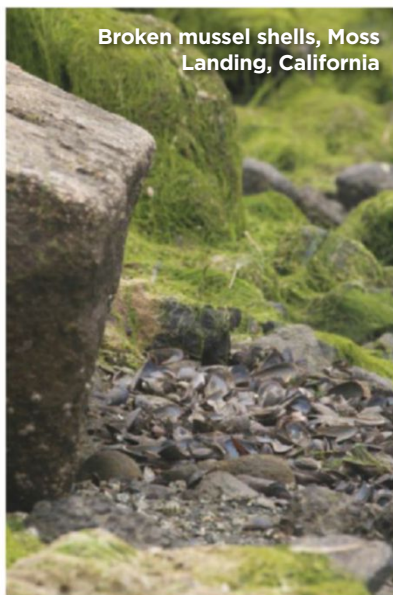
ANIMAL ARCHAEOLOGY

Sea otter, Moss Landing, California



Several of the sea otters that frequent Bennett Slough Culverts at Moss Landing in central California are in the habit of smashing mussels on waterside boulders to extract their meat. An interdisciplinary team of researchers has identified telltale evidence of this behavior, including visible patches of wear on points and ridges of the rocks facing the water, as well as a distinctive breakage pattern in the shells, with the left side intact and the right side broken in half diagonally. Underwater middens at the site are estimated to contain tens to hundreds of thousands of similarly smashed shells. Natalie Uomini, an archaeologist at the Max Planck Institute for the Science of Human History, says this type of research shows a new way to apply archaeological methodology to animal behavior. "Archaeology is a set of tools that allow us to study past behavior," she says. "But there's nothing inherent about it that says it has to be used on humans."

Broken mussel shells, Moss Landing, California



—DANIEL WEISS

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FROM THE TRENCHES



Wooden coffin



3-D model of the coffin



Deceased's name



Detail of a pair of eyes

THE UNSEEN MUMMY CHAMBER

Near the end of the dig season at a necropolis on the western bank of the Nile in Aswan, Egypt, a team led by Antonio Mozas-Calvache of the University of Jaen discovered a tomb with an unopened coffin visible inside. The approximately two-by-eight-foot chamber was largely closed off and its entrance far too narrow for the archaeologists to squeeze through. These limitations forced Mozas-Calvache and his team to improvise. They mounted a remote-controlled camera at the end of a 12-foot-long pole, pushed it inside the chamber, and used it to photograph the contents.

The team used the images to generate 3-D models of the tomb, including a detailed representation of the 3,800-year-old coffin. They were able to read hieroglyphs on the coffin, which revealed the mummy's identity to be Shemai, a previously unknown brother of late 12th Dynasty (ca. 1981–1802 B.C.) governor Sarenput II. Given advances in technology, says Mozas-Calvache, “I think that our work would have been impossible to carry out 10 years ago.” *To see a 3-D model of the coffin, go to archaeology.org/3Dcoffin.*

—JESS ROMEO



Tomb, Aswan, Egypt

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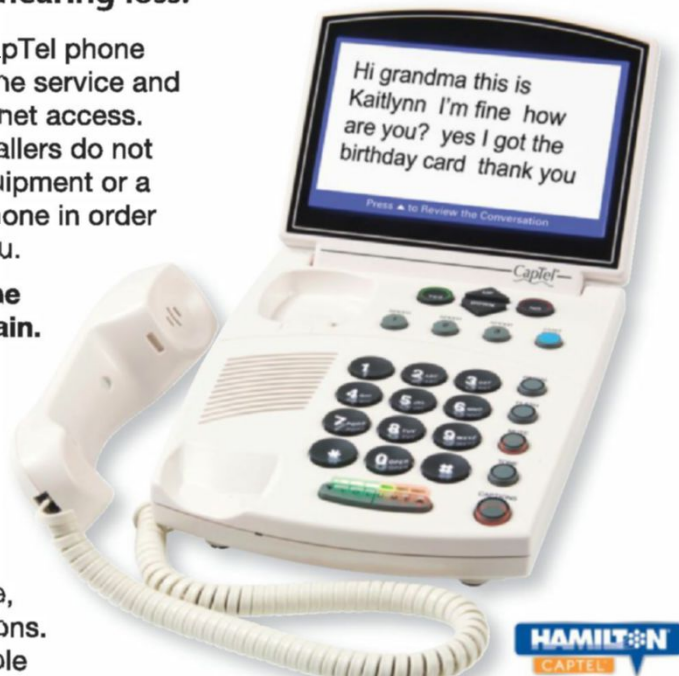
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NEANDERTHAL FASHION STATEMENT



The size and power of golden eagles have made these raptors potent symbols in modern human cultures around the world, but a new analysis of eagle bones found at sites across Europe and Asia shows they played an important role for Neanderthals as well. Researchers compiled data on bird bones found at 154 Neanderthal sites dating to as early as 130,000 years ago. The results show that, before they made contact with *Homo sapiens*, Neanderthals across Eurasia were hunting golden eagles and using parts of their carcasses, mainly the talons, as jewelry or other kinds of symbolic artifacts.

The findings run counter to the widely accepted idea that Neanderthals were big-game hunters who couldn't adapt to hunting smaller, faster prey, such as eagles, when bigger, slower species, such as elk and bison, were dying out. They also suggest that, independent of modern humans, Neanderthals were developing symbolic thinking alongside new techniques for exploiting a wider variety of resources, including birds. According to Stewart Finlayson, director of natural history at the Gibraltar National Museum, the findings show just how sophisticated Neanderthals were.

—ZACH ZORICH



SPRING BOARDS

A modern shipping accident off the coast of the Netherlands led to the discovery of a sixteenth-century shipwreck that may provide insight into a transitional period in the history of global exploration and commerce. Salvagers attempting to retrieve 300 shipping containers that had fallen into the North Sea from the merchant ship *MSC Zoe* during a storm in January 2019 also recovered three wooden planks and 12 timbers from a much older ship's frame, as well as a cargo of copper plates. Upon examination, the plates were found to bear the crest of the German Fugger family, one of early modern Europe's wealthiest banking families. Analysis of the wood has established that the ship was built in the late 1530s. The vessel sank sometime before 1545.

Underwater archaeologist Martijn Manders of Leiden University and the Cultural Heritage Agency of the Netherlands says the wreck represents a pivotal moment in Dutch shipbuilding. It is a very early example of the carvel method of building hulls, in which planks are laid flush from edge to edge. This is distinct from the traditional lapstrake method, in which hull planks overlap. According to Manders, this development went on to allow for construction of sturdier three-masted boats with much larger crew and cargo capacities. "It's a very important ship because 100 years later we're in the middle of the Dutch Golden Age," he says, "when three-masted vessels carrying hundreds of people are traveling regularly to the East Indies and the West Indies and circumnavigating the globe."

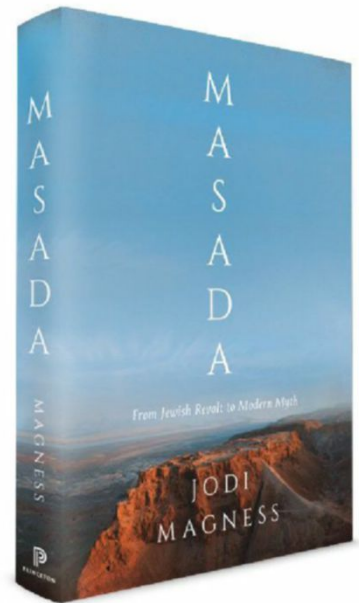
— MARLEY BROWN



Copper plate with Fugger family stamp



Wooden ship timbers



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—Tessa Rajak, author of *Josephus*

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CONNECTICUT: Coins, wampum beads, and other colonial-era objects found near the Webb-Deane-Stevens Museum in Wethersfield may be associated with the earliest settlers of Connecticut's

oldest English town. Archaeologists hope that these objects, along with the remains of a 17th-century wooden palisade, will provide vital information on one of the most infamous events in the state's history—a 1637 raid by Pequot Indians that killed several colonists and helped fuel the deadly conflict known as the Pequot War.

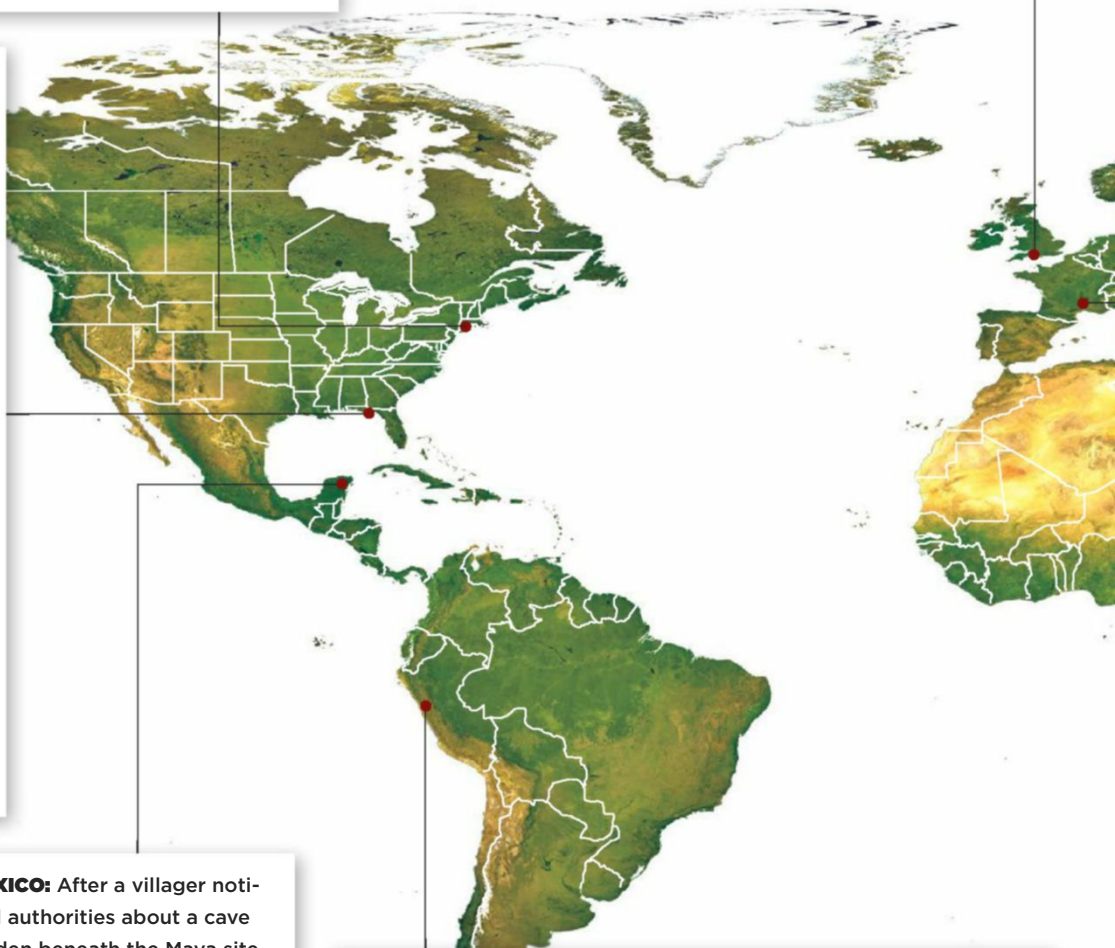


ENGLAND: During the 3rd millennium B.C., Neolithic Britons held annual celebrations at sacred monuments such as Stonehenge. New research reveals that people from all over the

island attended these BYOP—Bring Your Own Pig—feasts. Isotope analysis of porcine bones from several henge sites in southwestern England indicates that the pigs eaten there were not raised locally. Not only did festivalgoers travel from as far away as Scotland, northeastern England, and western Wales, they transported their own pigs with them.



FLORIDA: Artifacts from a 19th-century African-American community were exposed when Hurricane Michael uprooted dozens of trees at the site of a fort located on the Apalachicola River. The fort was originally built by the British during the War of 1812, and became a place of refuge for thousands of freed and escaped slaves who joined the British side. Shortly after the war's end, the U.S. Navy attacked the fort, blowing up a munitions cache inside and killing hundreds of people.



MEXICO: After a villager notified authorities about a cave hidden beneath the Maya site of Chichen Itza, archaeologists crawled hundreds of feet through passages that were

only 16 inches high in places. In the cave, they encountered hundreds of undisturbed ritual artifacts, including incense burners depicting the rain god Tlaloc. The region experienced a severe drought toward the end of the first millennium A.D., which may have compelled the Maya to descend into the cave and entreat the gods for rain.

PERU: An archaeology student walking through the site of

Castillo de Huarmey fell into a hole, accidentally discovering the tomb of a Wari metallurgist dating to around A.D. 800. The craftsman, who was approximately 20 years old when he died, was buried in a sitting position with his hands placed around a fabric bundle containing what appears to be an assortment of his favorite tools of the trade. The collection includes bronze knives, an ax, a saw, and bone-handled chisels.





FRANCE: Around 120,000 years ago, for a group of Neanderthals living in south-eastern France, drastic times called for drastic measures.

During a period of rapid warming, food became scarce, and, on at least one occasion, they were forced to eat their own. New insight into the Moula-Guercy Cave, where the dismembered and butchered remains of 6 individuals were found, suggests that, in the sudden absence of large mammals such as mammoth and reindeer, the meat-reliant Neanderthals were driven to cannibalism.



LEBANON: Between the 11th and 13th centuries, hundreds of thousands of Europeans ventured to the Near East in a campaign to reconquer the Holy Land. A new study suggests that the Crusader army

may have been more diverse than originally thought. DNA sequencing of 9 soldiers who were buried together in a mass grave near Sidon in the 13th century revealed, to the researchers' surprise, that 3 were European, 4 were Near Eastern, and 2 had a mixture of European and Near Eastern ancestry.



CHINA: One of the most remarkable aspects of the Terra-

cotta Army is the pristine state of the soldiers' bronze weapons after 2,000 years underground. Because trace amounts of chromium have been detected on the blades, scientists have long presumed that ancient Chinese craftsmen invented a type of anti-rust coating. However, researchers have learned that the chromium is actually contamination from lacquer applied to the weapons' handles and shafts, and is not responsible for the metal's preservation. It is now thought that the chemical composition of the surrounding soil helped prevent corrosion.



ISRAEL: A difficult-to-read inscription on a Roman mile marker in the Golan Heights has finally been deciphered. The

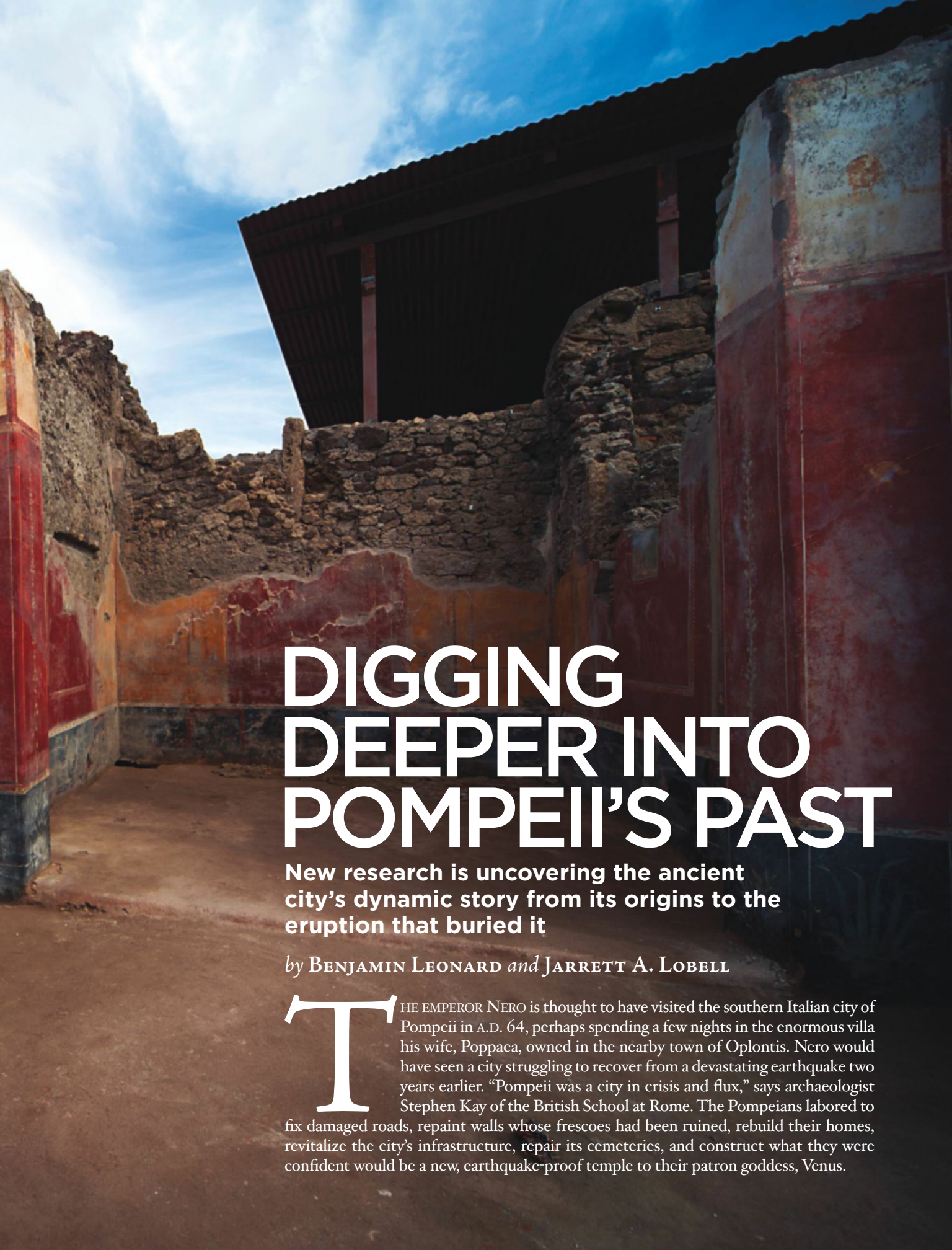
inscription was found to bear the name and titles of the Roman emperor Maximus Thrax, who ruled from A.D. 235 to 238. Among several distance markers that have been located along the Roman road outside ancient Hippos, this is the only one with any writing. Since the road was built long before the 3rd century A.D., it must have undergone substantial renovations during the emperor's reign.



IRAN: The necropolis in Shahr-i-Sokhta ("Burnt City") in southeastern Iran contains burials of as many as 37,000 humans—and at least one rhesus macaque. The animal was likely kept as the pet of a wealthy family. When it died more than 4,500 years ago, it was interred in the cemetery in the same style as a human infant. The monkey species, which was seen as a symbol of wealth, power, and prestige, is not native to Iran and may have been imported from the Indus Valley.

Two rooms in a vibrantly painted house were recently discovered by archaeologists in Regio V, a previously unexcavated part of ancient Pompeii.





DIGGING DEEPER INTO POMPEII'S PAST

New research is uncovering the ancient city's dynamic story from its origins to the eruption that buried it

by BENJAMIN LEONARD *and* JARRETT A. LOBELL

THE EMPEROR NERO is thought to have visited the southern Italian city of Pompeii in A.D. 64, perhaps spending a few nights in the enormous villa his wife, Poppaea, owned in the nearby town of Oplontis. Nero would have seen a city struggling to recover from a devastating earthquake two years earlier. "Pompeii was a city in crisis and flux," says archaeologist Stephen Kay of the British School at Rome. The Pompeians labored to fix damaged roads, repaint walls whose frescoes had been ruined, rebuild their homes, revitalize the city's infrastructure, repair its cemeteries, and construct what they were confident would be a new, earthquake-proof temple to their patron goddess, Venus.

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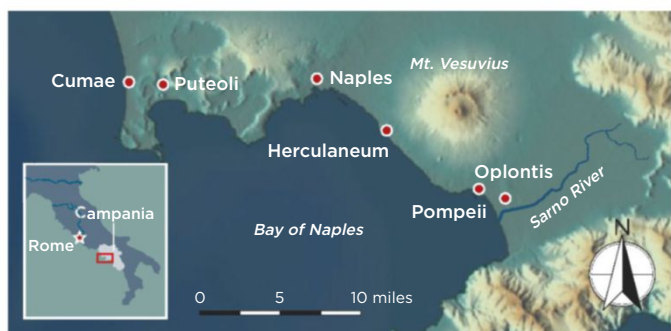
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The logo for AVXLIVE:ICU features the text 'AVXLIVE' in a bold, yellow-to-white gradient font, followed by a stylized yin-yang symbol where the two halves are replaced by images of the Earth and the Moon. To the right of the symbol is the text ':ICU' in a bold, yellow-to-white gradient font. The entire logo is set against a black background.

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The Pompeians may not have known it, but the A.D. 62 earthquake had been a warning that the volcano looming over their city was waking up after 700 years of dormancy. In A.D. 79, Mount Vesuvius erupted in one of the largest and deadliest volcanic events in history. A dense, high-speed rush of solidified lava called lapilli, volcanic ash, and super-heated gases rushed down Vesuvius' slopes and buried Pompeii and much of the rest of the region southeast of the mountain in as much as 20 feet of volcanic debris.

There is a tendency to think that Pompeii had always been just as it was in A.D. 79. However, by the first century A.D., it had already undergone as much as 1,000 years of change. "It's difficult to say who the original Pompeians were," says archaeologist Marcello Mogetta of the University of Missouri. "But if you dig below the A.D. 79 levels—which is a real challenge because you can't destroy mosaic floors and knock down frescoed walls—you start to see that Pompeii is a site with a very long history."

As early as the tenth century B.C., there may have been a small settlement on the site, occupied by descendants of Campania's Neolithic inhabitants. In the eighth century, when colonists from Greece settled the region, and then in the seventh century with the arrival of the Etruscans from the area to the north between the Arno and Po Rivers, Pompeii grew larger. Before the A.D. 79 eruption, the site overlooked the Sarno River and was nearly a mile closer to the coastline. But the eruption drastically altered the landscape, cutting off access to the Sarno, an important waterway for transporting

both people and the plentiful agricultural products cultivated in the area's fertile volcanic soil, and to the busy harbor that served the city. In the sixth century B.C., a fortified wall that would define the city for the next 600 years was constructed, its shape determined by the lava flow on which Pompeii sits.

Toward the end of the fifth century B.C., Samnites migrated from the mountains of south-central Italy and took over many of the region's Greek and Etruscan towns, including Pompeii, bringing with them new gods, customs, and building styles. "The Samnites became accustomed to urban life and, from this point on, the city was a kind of melting pot of cultures and really thrived," says Mogetta. The Samnites remained in control of the city until the late fourth or early third century B.C., when the Romans conquered the region. Two centuries later, Pompeii's residents felt themselves to be in a strong enough position to demand full Roman citizenship. This demand was rejected, and, in 89 B.C., the Roman general and dictator L. Cornelius Sulla took over Pompeii. In 80 B.C., the city was resettled as the Roman colony of Colonia Cornelia Veneria Pompeianorum, and Latin became the official tongue, replacing Oscan, the language of the Samnites. Pompeii continued to prosper and was a busy, cosmopolitan city of around 10,000 residents at the time of the eruption. During that catastrophe, thousands escaped their homes, but thousands of others would perish.

Pompeii lay entombed for 1,500 years, until its existence was hinted at in the late sixteenth century by small discoveries of ancient remains made by the Renaissance architect



Volcanic debris including lapilli, or solidified lava, and thick layers of compressed ash from the A.D. 79 eruption of Mount Vesuvius surrounds the doorway to a partially uncovered entranceway in Regio V.



A plaster cast of a horse killed during the eruption is the newest such cast to be made in Pompeii. The legs of another horse are also visible, suggesting the building in which they were found was a stable.

Domenico Fontana during construction of an underground water tunnel. No further work took place at the site for almost 150 years, when excavations began in earnest at the direction of Charles of Bourbon, the king of Naples. In 1763, an inscription was found confirming that the site, until then known only as La Cività, or “The City,” was in fact Roman Pompeii.

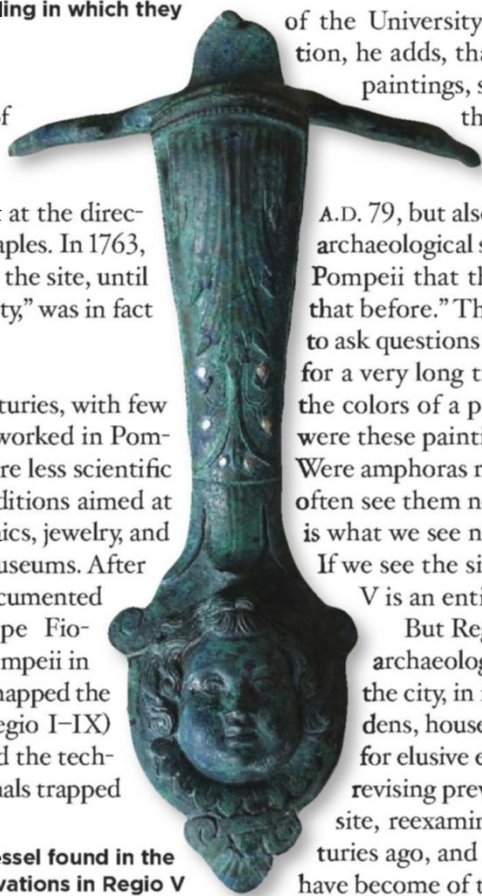
FOR MORE THAN TWO and a half centuries, with few interruptions, archaeologists have worked in Pompeii. Early on, these excavations were less scientific explorations than treasure-hunting expeditions aimed at collecting the paintings, sculptures, mosaics, jewelry, and silver that now fill many of the world’s museums. After decades of largely disorganized, poorly documented projects, Italian archaeologist Giuseppe Fiorelli became director of excavations at Pompeii in 1860. He meticulously documented and mapped the site, dividing it into the nine regions (Regio I–IX) that are still in use. Fiorelli also developed the technique of creating casts of people and animals trapped

by the eruption by pouring plaster into the hollows left in the volcanic debris by decayed remains. Excavations have continued ever since, halted only by World War II—when Pompeii was bombed—and a powerful earthquake in 1980.

Despite this nearly constant collecting, surveying, mapping, and digging, as of 2018, about a third of Pompeii still had never been excavated. At this point, in Regio V, in the northern part of the city, the layers of lapilli, ash, and volcanic mud started to collapse under their own weight, imperiling excavated properties and adjacent streets. To address this, a new excavation project was begun in a previously unexplored part of Pompeii. “The conventional idea when these excavations started was that they would solve issues of damage control and conservation,” says archaeologist Steven Ellis of the University of Cincinnati. There was an expectation, he adds, that all the typical Pompeian things—wall paintings, shops, mosaics—would be found. “What they’re finding is, in some ways, much more interesting,” Ellis says. “It’s enabling us to see not just the state of the city in

A.D. 79, but also what it was like when it first became an archaeological site 200 years ago. It’s a chance to see the Pompeii that the first excavators saw. We’ve never had that before.” This, he explains, is allowing archaeologists to ask questions about Pompeii that haven’t been possible for a very long time. “It’s more than just looking at how the colors of a painting have faded,” he says. “It’s ‘What were these paintings actually like when they were buried? Were amphoras really stacked against the walls the way we often see them now? Is this how the city really looked, or is what we see now a product of the past two centuries?’

If we see the site as an archaeological laboratory, Regio V is an entirely new kind of lab.” But Regio V is not the only part of Pompeii that archaeologists are investigating. At locations across the city, in its temples, public baths, restaurants, gardens, houses, villas, and cemeteries, they are looking for elusive evidence of Pompeii’s earliest settlements, revising previously held theories about the age of the site, reexamining properties that were excavated centuries ago, and even searching for evidence of what may have become of those who survived the eruption.



A decorated handle from a bronze vessel found in the new excavations in Regio V



RELIGION: THE TEMPLE OF VENUS OF POMPEII

The most important Roman deity in Pompeii was Venus, the goddess of love and beauty, and her temple, raised high on an artificial platform next to the Porta Marina (“Marine Gate”), was the city’s largest sacred site. The temple has been the subject of archaeological debate for at least the past decade. “Up until fairly recently, it was always thought that there was a direct link between the construction of the temple and the establishment of the Roman colony in the first century B.C.,” says archaeologist Marcello Mogetta of the University of Missouri, who directs current work at the site. But between 2005 and 2007, an Italian team questioned whether the first temple on the site had actually been dedicated to Mephitis, goddess of the pre-Roman Samnites, and later repurposed as a temple to Venus to honor P. Cornelius Sulla, the nephew of Pompeii’s Roman con-

Pre-temple construction layers



Samnite-period alley



queror, L. Cornelius Sulla. Venus was known to be the younger Sulla’s favorite goddess.

Although the Italian team concluded that the temple dated as far back as the late seventh century B.C., Mogetta’s ongoing excavations have now shown that while the area was settled earlier, the first temple on the spot was not built until after the establishment of the Roman colony in 80 B.C. “This debate is so important because it shows two different

views of the coming of the Romans to Pompeii,” Mogetta says. “It forces us to ask ‘Is the sanctuary an ancient place of pride for a local goddess that is honored even when the Romans take over—a not uncommon occurrence—or is it a case of a Roman goddess being imposed on the local population to send a message?’ This is crucial to our understanding of the changes brought about by the Roman conquest.”



Terracotta roof decoration



Women's hot bath, Stabian Baths



Water tower

WATER AND BATHING: THE STABIAN BATHS

Public bathing was a daily leisure activity for many Pompeians, and the baths were a place for exercise, pampering, and social gatherings with friends. The Stabian Baths, the oldest of five public bath complexes in the city, were built sometime after 125 B.C. and occupied a prime location at the intersection of two main thoroughfares. Around the turn of the first century A.D., the baths were supplied for the first time with running water from the public aqueduct. Water had previously come from a well that supplied a reservoir on the complex's roof. "This caused a major revolution in bathing culture," says archaeologist Monika Trümper of the Free University of Berlin, who leads ongoing excavations of the baths. Renovations of the Stabian Baths at the time introduced amenities such as a cold-water pool, a hot bath, running fountains, and heated walls and floors in the complex's warm and hot rooms.

Rebuilding efforts undertaken after the earthquake that struck Pompeii in A.D. 62 made the Stabian Baths an even more luxurious space. In addition to necessary repairs, Trümper explains, the complex was again completely remodeled, enlarged, and embellished with new decoration to match the state-of-the-art standards set by the Central Baths, which were under construction nearby. A swimming pool and decorative fountains were added, along with new shops on the building's street front. "The earthquake was the chance to rebuild the city," Trümper says, "and to modernize bathing facilities in grand style."



INDUSTRY: BAKING AND BAKERIES

Pompeii's many street-side snack bars offered those seeking a quick bite a choice of prepared food and wine. Evidence for the Pompeian food scene includes not only carbonized remains of foodstuffs such as bread preserved by the eruption, but also production facilities, including bakeries and vats for salting fish. In the first century B.C., leavened bread production was confined to several large houses outfitted with domed ovens. According to archaeologist Nicolas Monteix of the University of Rouen, it's unclear whether these early bakers produced bread solely for their own households or, at least in part, for sale to customers.

By the first century A.D., however, these domestic bakeries had been shuttered and larger-scale commercial bakeries had popped up across the

city. Although most Pompeians' diet consisted largely of cereal-based porridges, and bread still wasn't widely available to the poor, "I would consider this shift a democratization of bread consumption," says Monteix, who led a recent project aimed at documenting Pompeii's 39 excavated bakeries. The rise of commercial bakeries reflected not only a jump in the city's popula-

tion, he explains, but perhaps also an increase in grain imports from Egypt and North Africa during the Pax Romana, a period of peace and prosperity in the Mediterranean that was ushered in by the emperor Augustus. The presence of specialized technology in a few of the bakeries, such as hydraulic systems for soaking grain and vessels for dough rising, enabled Pompeii's bakers to produce high-quality bread for wealthier residents.



Interior of a domed oven



GARDENS: THE CASA DELLA REGINA CAROLINA



Atrium, Casa della Regina Carolina

ologists including Gleason and Caitlín Barrett of Cornell University and Annalisa Marzano of the University of Reading now hopes to learn about the garden's original landscaping, as well as find traces of religious activity that might have taken place there. In particular, they plan to explore the house's two garden shrines, where nineteenth-century excavators found such objects as a marble incense burner and a statuette of the goddess Diana. "These shrines provide us with sites where ritual activity took place," says Barrett. "The material culture can hopefully speak to the performance of those rituals."

Pompeii's residents spent a great deal of time socializing in the city's lush public and domestic gardens. "What's remarkable about Pompeii is the enormous variety of gardens, and the extent to which Pompeians lived both inside and outside," says archaeologist Kathryn Gleason. "Pompeians' devotion of valuable real estate to gardens is noteworthy." One of the largest private gardens could be found at the back of the Casa della Regina Carolina, an opulent dwelling named in the nineteenth century after Caroline—the queen of Naples and sister of Napoleon Bonaparte—who visited during its initial excavation. Celebrated for its vibrant decoration in the years after its discovery, the house was largely forgotten as its wall paintings faded.

Returning to the property after more than a century, a team of archae-

COMMUNICATION: ANCIENT GRAFFITI

Anyone walking along Pompeii's busy streets couldn't help but notice the eye-catching letters painted across many of the city's houses, shop fronts, and public spaces. Some of this graffiti promoted political candidates, while other examples advertised everything from gladiatorial games to rooms for rent. However, not all messages on Pompeii's walls were so showy. Thousands of examples of a less conspicuous type of ancient graffiti—writings and drawings incised in wall plaster, or occasionally written with more ephemeral materials such as charcoal and chalk—survive today and capture communications among Pompeii's residents. "Unlike most modern graffiti, graffiti in ancient Pompeii was a positive form of social exchange," says epigrapher

Rebecca Benefiel of Washington and Lee University. One of the most commonly found words in this more informal style of graffiti is *feliciter* ("happily"), which, when paired with personal names, indicates good wishes for friends, colleagues, and even the emperor.

Benefiel is director

of the Ancient Graffiti Project and is currently documenting and analyzing all the extant graffiti in Pompeii, much of which is at risk of fading away. She has identified examples of all sorts of writing across the city, including tally marks scratched on shop walls to track item inventories and the words of satisfied customers who scrawled praise for the sexual prowess of prostitutes in the city's main brothel. In both private houses and public buildings, Benefiel has found that people traded quotations from the first-century B.C. love poets Ovid and Propertius, often adapting poetic lines to humorous effect. Says Benefiel, "Looking at graffiti in context gives such a strong sense of the people who inhabited these spaces and left their mark."



Feliciter graffito, House of Maius Castricius



Painted election slogans, Regio V

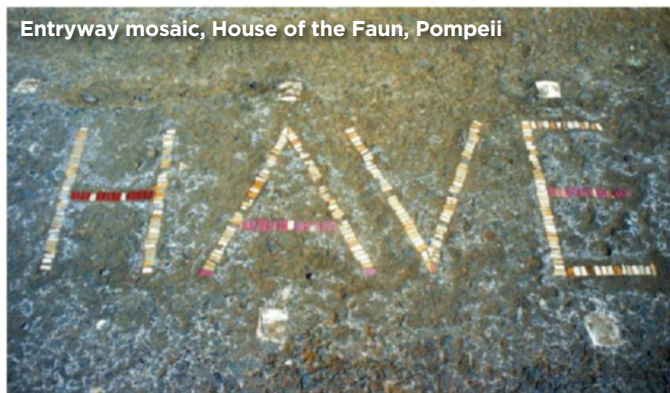


A 3-D reconstruction of the villa's courtyard

Grand Tour artists drew and sold scenes of the villa. Paradoxically, though, explains Dessales, while it has been one of the most widely represented buildings in Pompeii for more than 250 years, the Villa of Diomedes' 2,000-year-plus history from its foundation through A.D. 79 to the present has never been comprehensively understood. For the past seven years, Dessales has supervised an international project that has taken more than 25,000 new photographs and used software to combine these modern images with more than 350 archival ones showing the villa at different times since its discovery. They have created the first highly detailed 3-D model of a residential property in Pompeii.

THE ERUPTION'S AFTERMATH: THE SURVIVORS

Entryway mosaic, House of the Faun, Pompeii



Thousands of people perished in the eruption of Mount Vesuvius, but many Pompeians managed to flee the city and the volcano's blast zone. For 30 years, the question of where these survivors went has intrigued archaeologist Steven Tuck of Miami University of Ohio. One source of evidence he has explored is the existence of massive building projects undertaken by the emperor Domitian in the nearby cities of Naples, Cumae, and Puteoli in the years after the eruption. "Whole neighborhoods, suburbs, roads, aqueducts, water systems, amphitheaters—all of the infrastructure for an urban community—was poured into these communities on the Bay of Naples by the imperial government," Tuck says.

To trace the relocation of individual survivors to these and

other towns in the area, Tuck scoured inscriptions from pre-eruption Pompeii for distinct Roman family names. He then identified these same names in inscriptions in communities where refugees may have moved after A.D. 79. Tuck has concluded that survivors seem to have resettled in cities where they had social and economic opportunities, rather than where their blood relatives lived. Still, many Pompeian survivors maintained ties to their city in their new communities, particularly through marriage to other Pompeians. For example, a late first-century A.D. inscription found in Naples reads:

*To the spirits of the dead
Farewell Vettia Sabina
you who lived ever so well.
Marcus Tullius Dionysius
to his dearest wife
who lived 24 years, 3 months, 22 days*

Tullius and Sabinus (the male version of Sabina) are both well-known Pompeian family names. This inscription also contains the only known example from Naples of *have*, a word that in the Oscan language of Pompeii's pre-Roman settlers means both "greetings" and "farewell." ■

Benjamin Leonard is a senior editor and Jarrett A. Lobell is editor in chief at **ARCHAEOLOGY**.

Did an ancient culture
master a fundamental
force of nature?

by JASON URBANUS

Magnetic



A five-foot-tall head from the site of Monte Alto in Guatemala was carved some 2,300 years ago from basalt that had been magnetized in a lightning strike.

THE CENTRAL PLAZA OF the town of La Democracia in southern Guatemala is graced by a collection of 11 rotund stone sculptures. Archaeologists recovered the works from the nearby ancient city of Monte Alto, whose early residents were likely Maya. The sculptures, which artists hewed from basalt boulders some 2,300 years ago, depict monumental heads or generously propor-

tioned seated bodies. Weighing in at as much as 10,000 pounds and measuring up to six feet tall, their distinctive faces feature thick eyelids, drooping jowls, and lips pursed as if captured in the act of whistling, traits they share with other “potbelly” sculptures found throughout the region. Although the figures’ almost comical forms are appealing, their aesthetics aren’t their only draw. A team of geologists and archaeologists led by Harvard University planetary scientist Roger Fu has confirmed

Mesoamericans

that the artists of Monte Alto sculpted the features of some of these potbelly figures in such a way that their facial and navel areas are magnetized. “As far as I know, aligning certain anatomical features on sculptures with magnetic anomalies is an unprecedented use of magnetism,” says Fu.

Monte Alto flourished as a regional center from about 300 B.C. to the very end of the first century B.C., and was ruled by nobles who governed a class of commoners largely composed of maize farmers. The potbelly figures are believed to have represented the revered ancestors of these nobles, and were positioned in full view of Monte Alto’s residents. “These representations were used to establish public worship of the royal ancestors and help solidify the elites’ control,” says Harvard archaeologist Nicholas Carter, who was part of the team that analyzed the sculptures. “There must have been elaborate rituals centered around these potbelly sculptures.”

ARCHAEOLOGISTS HAD PREVIOUSLY established that some of the Monte Alto potbellies seemed to have magnetic properties, but they weren’t able to determine the cause of the anomalies, or verify that they were not the result of recent contamination by hand magnets. “We wanted to use quantitative methods to confirm their observations,” says Fu. His team surveyed the sculptures with magnetometers, instruments Fu usually uses to measure the magnetic properties of rock outcroppings. They determined that, prior to being carved, the boulders had been struck by lightning, producing areas of magnetized rock.

A sculpture from Monte Alto measuring about five feet tall and five feet wide was found to be magnetized around its belly.



The researchers suggest that ancient sculptors could have detected these magnetic hot spots using naturally occurring magnets called lodestones. At the Olmec city of San Lorenzo, archaeologists found a magnetized stone bar crafted between 1400 and 1000 B.C. that might have served as such a lodestone. Similarly, iron-rich pyrite mirrors were common in ancient Mesoamerica, and studies have shown that some 6 percent of them possess magnetic properties.

When Monte Alto’s artists sculpted a potbelly, they may have used lodestones or pyrite mirrors to locate anomalies, allowing them to line up the magnetic areas of a particular basalt boulder with the face or torso. The finished sculpture’s ability to repel or attract objects during carefully staged rituals would surely have left viewers awestruck and created the illusion that the ancestral spirit still lived within the whistling potbelly figure. “Mesoamericans were careful observers of the natural world,” says Carter. “We shouldn’t be surprised that they had a keen awareness of a phenomenon such as magnetism.” ■

Jason Urbanus is a contributing editor at ARCHAEOLOGY.

THE PRAYERSTONE HYPOTHESIS

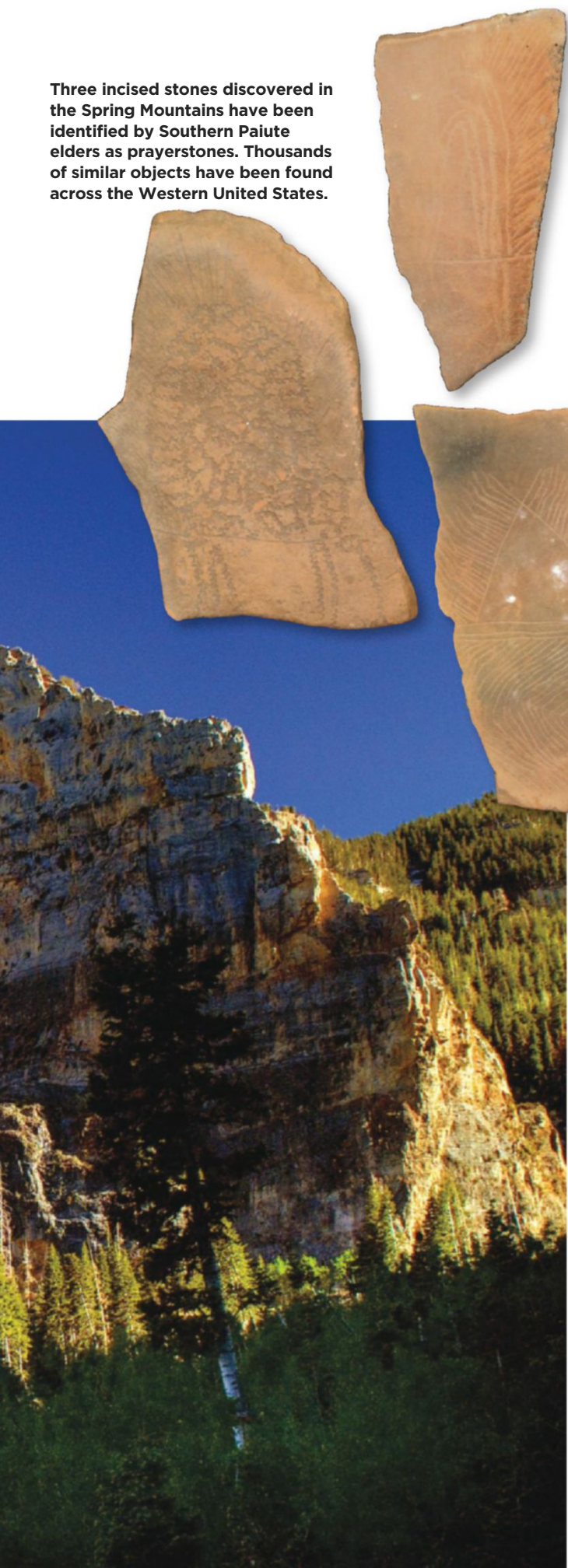
Thousands of decorated stone artifacts in the American West may be the key to understanding a people's contested history

by ERIC A. POWELL

Mount Charleston, the highest peak in southern Nevada's Spring Mountains, is sacred to members of the Southern Paiute tribes.



Three incised stones discovered in the Spring Mountains have been identified by Southern Paiute elders as prayerstones. Thousands of similar objects have been found across the Western United States.

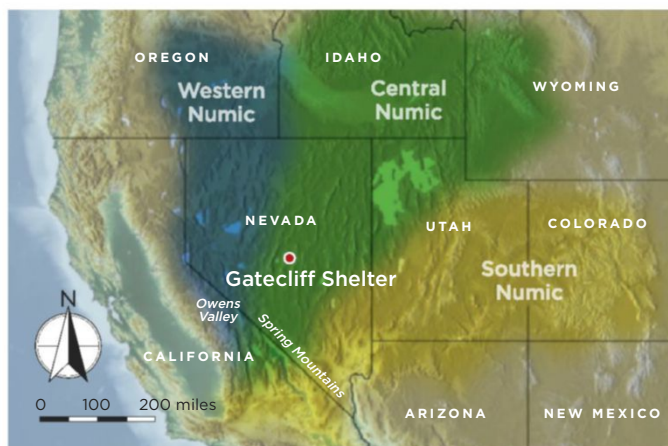


IF YOU ARE ONE OF THE 45 million annual visitors to Las Vegas, you might happen to glance west at some point during your stay and notice that the horizon in that direction is dominated by the Spring Mountains. For most visitors, these craggy limestone peaks—Nevada's most biodiverse range—are a distant backdrop to the glitz and bustle of Las Vegas. To the area's residents, they might be a destination for camping and hiking. For the 2,000 people of the 11 tribes of the Southern Paiute, though, the Spring Mountains are sacred, the place where they were first created. They call the range's highest peak, Mount Charleston, Nuvagantu, or "where the snow sits." Some Southern Paiute believe Nuvagantu marks the end of the Salt Song Trail, the path to the afterlife. On Nuvagantu, they believe, portals connect the physical and spiritual worlds.

In the early 2000s, Southern Paiute elders shared some of these traditions regarding the Spring Mountains with ethnographers from the University of Arizona's Bureau of Applied Research in Anthropology. As part of a joint project to record Southern Paiute beliefs related to the landscape, the elders also shared their knowledge about archaeological artifacts that had been discovered in the mountain range. One particular class of artifact they discussed were incised stones, which are found throughout the Great Basin, a vast region of deserts and mountains in the American West that includes most of Nevada and sections of several neighboring states. The stones are decorated with a great variety of often intricate geometric patterns.

The Southern Paiute elders immediately recognized the incised stones as prayerstones, objects that their ancestors had left on the landscape as votive offerings accompanying prayers for personal power, or *puha*. "Describing puha is a little like trying to describe the meaning of life," says traditional leader and religious practitioner Richard Arnold of the Pahrump Paiute Tribe. "It's a deep power that goes throughout the world and keeps it in balance." The Southern Paiute share their belief in puha with other Great Basin people such as the Ute and Shoshone, who speak languages closely related to Southern Paiute. All of these languages belong to the Numic language family.

Prayerstones had been made by Numic peoples living within historical memory, so the Southern Paiute elders had no doubt what they were and why they were found in the Spring Mountains. "They came from the creation place of Southern Paiutes and other parts of our holy lands," says Arnold. "The stones are an important link to sustaining balance in the world and are intertwined with important elements that keep our cultural landscape strong." He explains that Southern Paiute ancestors left prayerstones near powerful places, such as trails and caves, going back to a time "when the world was new." The earliest prayerstones discovered by archaeologists in the Great Basin were made around 3700 B.C. "We knew they were made for thousands of years," says American Museum of Natural History archaeologist David Hurst Thomas, who has studied prayerstones extensively. "We just didn't know what they meant."



The Numic languages are divided into three subfamilies spoken by Native Americans in the American West.

The notion that today's Numic people have a deep history on the landscape of the Great Basin stretching back thousands of years is controversial among scholars. Many archaeologists and linguists believe that the ancestors of today's Shoshone, Paiute, and Ute only began to live throughout the Great Basin 1,000 or even 500 years ago. This theory, known as the Numic Spread, posits that Numic people left valleys in today's southern California and fanned across the Great Basin, rapidly replacing pre-Numic hunter-gatherers during the course of a single, relatively recent migration. The acceptance of this theory has sometimes led to Numic people being left out of decision-making processes regarding ancient sites on public land that predate A.D. 1000.

Now, an analysis of all the known incised stones found in the Great Basin supports the Southern Paiutes' contention that prayerstones played a central role in a continuous religious tradition. The analysis, carried out by Thomas, has inspired a new concept, the Prayerstone Hypothesis, which not only supports the idea that incised stones have long played a significant role in Numic cosmology, but also the abiding belief of the Southern Paiutes and their fellow Numic speakers that their ties to the Great Basin are very old indeed.

WHEN SPANISH EXPLORERS first reached the Great Basin in the mid-eighteenth century, they found Shoshone, Paiute, Ute, and other Numic peoples thriving in the harsh landscape. Living in extended family groups of fewer than 20, Numic people hunted a wide range of game, from gophers to bighorn sheep. However, they spent much of their time collecting roots, nuts, and seeds, which provided the majority of their caloric intake.

In the 1920s, anthropologist Julian Steward began to conduct ethnographic work in the Great Basin and focused on how environmental factors there shaped people's subsistence strategies—what he called the “gastric” elements of Numic people's culture. Steward was one of the first to classify the Numic languages, dividing them into the Western,

Central, and Southern subfamilies.

In the 1950s, linguist Sydney Lamb first coined the term “Numic,” after the word *numa*, which means “person” in most of the languages. He proposed that Numic languages were so closely related that they must have descended from a common tongue within the relatively recent past. Lamb went further, suggesting that Numic speakers originally came from a homeland around southern California's Death Valley and migrated to the areas where they now live about 1,000 years ago at the very earliest. A map of the distributions of the Western, Central, and Southern Numic languages across the Great Basin shows that they appear to radiate out in a fan shape from southern California, which seems to support Lamb's proposed Numic Spread theory.

A prominent supporter of this theory is University of California, Davis, archaeologist Robert Bettinger, who has long worked in California's Owens Valley, on the western edge of the Great Basin. There, Bettinger believes he has mustered archaeological evidence for the origins of the Numic Spread. He has found that beginning around A.D. 600, hunter-gatherers in the Owens Valley began to move from a way of life based on extensive game hunting to one that was more focused on collecting resources such as pinyon pine seeds. Around this time, people in the Owens Valley first began using twined flat baskets—called seed beaters—which are a highly efficient means of gathering seeds. At the same time, people in the region were adopting the bow and arrow, which was rapidly making its way from north to south across the Americas. Bettinger and his colleagues proposed that the people of Owens Valley were the original Numic speakers, and that their adoption of the bow and arrow and the new baskets for harvesting seeds made them highly successful in the Great Basin. This, Bettinger believes, allowed them to spread out quickly from their homeland, beginning perhaps around A.D. 1200. Soon, the ancestors of today's Shoshone, Paiute, and Ute had established themselves across the Great Basin, replacing or absorbing the pre-Numic peoples. “If we're right, then this was a really remarkable evo-



Owens Valley in eastern California is believed by some archaeologists to be the original homeland of Numic-speaking people.

lutionary event,” says Bettinger. “This wasn’t an invasion, with armies wiping people out. It wasn’t even particularly violent, I think. It was simple family groups moving across the landscape, making the best of this Great Basin environment.”

Today’s Numic speakers vehemently disagree with the Numic Spread theory. For one, there is no commonly recognized Numic oral history, as would be expected, of recent journeys, nor any implying their ancestors conquered the land where they currently live. “We just don’t have any traditions that suggest the Numic Spread happened,” says Arnold. Over the years, some scholars have also questioned whether the archaeological record shows that a single, recent migration resulted in today’s geographic range of Numic speakers.

In the early 2000s, when Thomas first learned that Southern Paiute elders had identified incised stones from the Spring Mountains as prayerstones, he was inspired to resume his studies of the artifacts. During the 1970s, when he and his team excavated a site known as Gatecliff Shelter in central Nevada, they discovered 428 incised stones in and around the site, the largest single collection from the Great Basin.

“What the Southern Paiute elders were saying about prayerstones made perfect sense to me,” says Thomas, who believes archaeologists need to take Native American ideas about their past seriously. “But, as a scientist, I had to test the hypothesis against the archaeological evidence.” Working with museums and universities across the West, Thomas was able to document about 3,500 known incised stones. Some had been privately collected and donated to museums, but perhaps one-third had been excavated from reliably dated archaeological contexts. These included artifacts unearthed from multiple layers of rock shelters dating back thousands of years to those discovered inside a house built by a Western Shoshone family as recently as 1880.

By surveying the known prayerstones and analyzing where they had been found, Thomas discovered that the practice of placing incised stones in the landscape had remained remarkably consistent for thousands of years in some parts of the Great Basin. Most were found in deeply important sacred spaces that corresponded to the logic of puha. These stones had been tucked into cracks deep inside caves and houses or left along trails and sacred springs, or at dramatic points on the landscape.

Thomas also identified four main enduring traditions, or “constellations of practice,” of decorating prayerstones. One was the Las Vegas constellation, which includes around 1,100 incised stones, including those found in the Spring Mountains. These differ dramatically from others found in the Great Basin, and include stones that feature feather-like markings, called the fringe-flap motif, that were first made as early as 1500 B.C. An incised stone with this same motif was placed in



Three prayerstones unearthed at Gatecliff Shelter in central Nevada are among more than 400 incised stones discovered in and around the site.

a rock shelter by Southern Paiute people who lived in the eighteenth or nineteenth century A.D., suggesting that this type of prayerstone was made without detectable change in its decoration or composition for at least 3,000 years.

“How could Southern Paiute ancestors have participated in practices that spanned multiple millennia if they only arrived in Nevada a few hundred years ago?” asks Thomas.

For his part, Bettinger agrees that Thomas’ analysis shows that the act of making and placing prayerstones seems to be an ancient practice, but he thinks it’s possible that Numic speakers moving into the Great Basin could have adopted it from their predecessors. “Maybe this is an echo of pre-Numic people’s culture,” says Bettinger.

While it might be possible that some Numic speakers adopted beliefs that predated their presence,

Thomas says, the archaeological record shows that at least in the central and southern Great Basin, distinctly Numic traditions of placing prayerstones began some 5,000 years ago, and were carried forth unchanged into the historic period by Numic people. “There are no perceivable breaks in prayerstone practices during that entire period, and no new prayerstone practices begin within the last 1,000 years,” says Thomas. “The Southern Paiute elders had it right.”

IF THE ANTIQUITY OF prayerstones can help confirm that Native Nevadans have much more ancient ties to the central and southern Great Basin than the Numic Spread theory allows, this could aid Numic people in the future. Further evidence that their ancestors lived on the land long before A.D. 1000 could support their claims to links with ancient sites on government lands. Eventually, prayerstones might even be eligible to be returned to the tribes under the terms of the Native American Graves Protection and Repatriation Act, which gives tribes the right to request the return of sacred items collected on federal land.

The Prayerstone Hypothesis makes a great deal of sense to Richard Arnold. His Pahrump tribe is native to a valley just below the Spring Mountains, where so many of the prayerstones have been found. Its members take care to safeguard traditional knowledge about Mount Charleston, the sacred Nuvagantu. “We’ve known prayerstones were used for a long, long time,” says Arnold. “The ones we recognize, they retain the puha, that power that they have always had.” ■

Eric A. Powell is deputy editor at *ARCHAEOLOGY*.

Place of the Loyal Samurai

On the beaches and in the caves of a small Micronesian island, archaeologists have identified evocative evidence of one of WWII's most brutal battles

by DANIEL WEISS



ON THE MORNING OF September 15, 1944, some 18,000 U.S. marines from the First Division invaded the tiny Western Pacific island of Peleliu, at the south end of the Palau archipelago. Nearly three years after the Japanese attack on Pearl Harbor, the Americans and their allies were on the offensive, pushing their way across the Pacific. This campaign involved millions of U.S. military personnel, and unfolded over thousands of miles of ocean. Many of the key battles were fought over Pacific islands such as Guadalcanal and Guam, both of which the Americans captured after fierce



U.S. marines advance on Orange Beach during the September 15, 1944, invasion of the Western Pacific island of Peleliu. The same stretch (left) of Orange Beach photographed in 2010.

fighting. They then established bases on these islands as they advanced closer and closer to Japan. By fall 1944, the Americans were eager to begin a long-planned invasion of the Japanese-occupied Philippines. They saw Peleliu, which lies 500 miles east of the Philippines and had excellent harbors and a Japanese-constructed airfield, as a valuable launching pad.

Shaped like a lobster claw, Peleliu measures at most five miles long by two miles wide. Because the island is so small, Marine Corps Major General William Rupertus predicted it would be subdued in a few days, despite the 11,000 Japanese troops and at least 3,000 Korean and Okinawan forced



GREEN WAVES ON ORANGE BEACH....Marines of the First Division pinned down by heavy enemy mortar fire, remain near their equipment as they hit "Orange Beach 3", on Peleliu Island, in the Palau group, of the Caroline Islands. Amtracs, hit while carrying the green clad Leathernecks ashore, burn in the background.

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Sept 1944

PHOTO INDEX U. S. PAT. NO. 2
TOP ROW: MAJOR GEOGRAPHIC LOCATION
HUNDREDS
TENS
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laborers ready to defend it. In fact, the battle, code-named Operation Stalemate II, ended up dragging on for more than two months. The marines were reinforced, and later relieved, by 11,000 soldiers from the U.S. Army's 81st Infantry Division. Over the course of the battle, the Americans unleashed an astounding barrage of munitions. Navy ships anchored offshore fired almost 6,000 tons of shells. Navy and marine aircraft dropped at least 800 tons of bombs. In their month on the island, the marines expended almost 16 million rounds of ammunition, including 116,000 hand grenades. The toll on the Americans was great—at least 1,600 died on Peleliu. For

the Japanese, the toll was catastrophic. Fewer than 100 soldiers survived. And, in the end, it was all for nothing. The invasion of the Philippines started on October 20, even as the battle for Peleliu raged on.

"Peleliu was the first real slugfest where the Japanese consciously hung back to try to cause the maximum number of casualties for the Americans so they would think twice about invading an island like that again," says Rick Knecht, an archaeologist at the University of Aberdeen who previously served as an ethnographer with Palau's Bureau of Arts and Culture. "But the Americans had enough resources to keep throwing in more

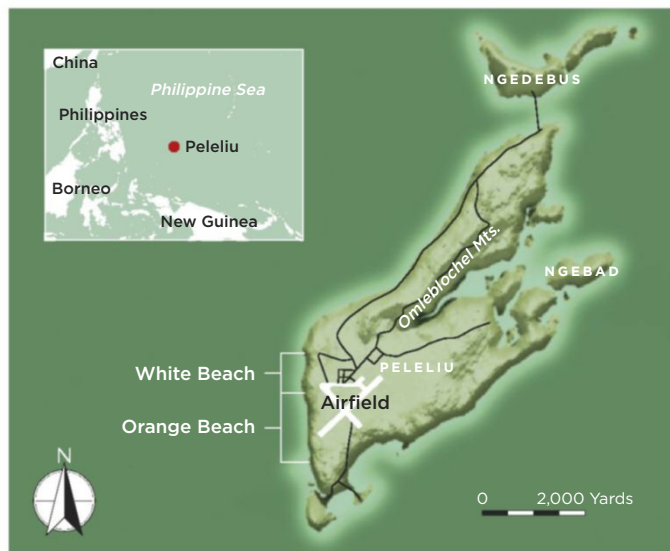
people and materiel. It was just plain ugly, and it dehumanized everyone involved.”

Peleliu is now barely remembered by comparison with more strategically consequential World War II engagements such as Guadalcanal and Iwo Jima, but its battlefield is the best preserved of the entire Pacific Theater. Since the war’s end, the island’s residents have generally avoided the areas where combat was most intense, which were left littered with human remains

and unexploded munitions, and which are hilly and obscured by thick foliage. (See “Peleliu’s Battle” on p. 47.) For Knecht and a team of fellow archaeologists who have carried out two surveys of the battlefield—accompanied by demining experts who disabled and removed dangerous explosives—Peleliu has offered a rare opportunity to document the experience of soldiers on the front lines of the battle for the Pacific. “There are skulls and helmets and all the soldiers’ stuff lying there just as it was



Marine infantrymen (top) charge across the runway of an airfield constructed by the Japanese on Peleliu on the day after the invasion. The site of the airfield (above) has been reclaimed by jungle in the 7 decades since the end of the war.



left after the battle,” says Knecht. “It’s gruesome and horrible, but war is gruesome and horrible. Short of going into combat, Peleliu is probably the closest experience to being on a World War II battlefield.”

The project, which was initiated by Palau’s Bureau of Arts and Culture and carried out in cooperation with government representatives as well as traditional chiefs on Peleliu, has explored hundreds of sites on the island. Several stand out as illustrative of the battle’s three phases: the American invasion and struggle to gain a foothold in the island’s low-lying western plain, the drawn-out period in which the Americans slowly ground away at the Japanese defenses in the island’s mountainous north, and the point when the Japanese leaders recognized their cause was lost. Archaeologists have also found personal items that, in some cases, they have been able to link to individual soldiers by name. And, they uncovered an inscription that offers insight into the mindset of young men willing to fight to the last.

THE JAPANESE HAD responded to previous Pacific island invasions with large-scale, suicidal charges that, although ultimately doomed, led to high casualty rates for the Americans. On Peleliu, Imperial Japanese Army Colonel Kunio Nakagawa pioneered a new strategy that involved setting his defenses in the Omleblochel Mountains, a series of ridges that line the island’s northeastern peninsula. Although these mountains are at most several hundred feet high, they feature

steep cliffs and deep ravines that make them extremely hard to penetrate. In the months before the invasion, the Japanese had transformed this difficult terrain into a fortress, using hundreds of natural and artificial caves, along with connecting tunnels, as hideouts. This strategy made the battle very different from those that had preceded it, and went on to serve as a model for the Japanese defense of Iwo Jima and Okinawa.

When the marines made landfall on a pair of beaches on Peleliu’s west coast code-named White and Orange, they were met with a fusillade of artillery, mortar, and small-arms fire from Japanese emplacements flanking the assault beaches. Additional fire rained down from positions the Japanese had established in the island’s southernmost hills above the beaches and the airfield, which was the Americans’ primary objective. The day after the invasion, a full regiment of marines charged across the exposed airfield. Although they managed to capture it with relatively few casualties, for the infantrymen involved, the ordeal was harrowing. Marine Corporal Eugene Sledge describes it in his memoir, *With the Old Breed: At Peleliu and Okinawa*, as his worst combat experience of the entire war. “Chunks of blasted coral stung my face and hands while steel fragments spattered down on the hard rock like hail on a city street. Everywhere shells flashed like giant firecrackers,” he writes. “...To be shelled by massed artillery and mortars is absolutely terrifying, but to be shelled in the open is terror compounded beyond the belief of anyone who hasn’t experienced it.”

During the battle, much of the island was completely denuded of vegetation by intensive bombardment from air, sea, and ground. What was left was a moonscape of jagged white limestone that tore up the soldiers’ boots and uniforms, abraded



American troops fire a flamethrower at the entrance to one of the several hundred caves on Peleliu in which the Japanese holed up during the Battle of Peleliu.



A helmet, sake bottles, and ammunition are among the items left behind in a cave used by Japanese troops.

their skin, and mercilessly reflected the tropical sun, sending temperatures soaring as high as 115°F. In the decades since, the island has been reclaimed by dense jungle. Nonetheless, explains archaeologist Neil Price of Uppsala University, codirector of the project along with Knecht, “The airfield is easily recognizable. It’s mostly under jungle cover now, but you can still orient yourself, and the buildings that the Americans were attacking are still there, shot to pieces.”

One such building, between the airfield and White Beach, was a Japanese fuel-storage bunker that became the focus of an intense firefight in the battle’s early days, according to marine battalion reports and firsthand accounts of participants. After 35 marines were killed or wounded, their comrades, finding their ammunition useless against the bunker’s thick walls, called for supporting fire

from the Navy fleet anchored offshore. A 14-inch shell slammed into the bunker, killing approximately 20 Japanese troops and leaving behind a giant hole that is still visible. “There are several reinforced structures that were shelled by the offshore fleet during the battle, with circular holes from direct hits that went through the walls,” says Price. “They’re enormous, and they penetrated multiple layers of concrete and all the rebar inside. You sort of stare at this and think, ‘What on earth was it like when that happened?’”

AFTER A WEEK OR SO of hard fighting, the marines had secured the airfield and other low-lying areas of Peleliu. They had also made inroads into the southern hills, and were no longer prey to Japanese bombardment from above. Then the real battle began. The Japanese had holed up in the hundreds of heavily armed, difficult-to-access caves they had prepared in the mountains. For the next two months, the Americans attacked with increasingly vicious means. First they dropped high explosives from aircraft and launched shells from battleships. Next they fired flamethrowers into cave openings, followed by grenades. Then they attacked the soldiers with machine guns and pistols. After that they called in napalm drops, waited for the jellied gasoline to seep into the porous rocky ground and the caves below, and then ignited it with phosphorous mortar bombs. When all else failed, they sealed the caves shut with bulldozers and dynamite, trapping Japanese soldiers inside.

During their surveys, Knecht and Price’s team visited nearly 200 caves that were used during the battle. Many contained charred bones and bits of uniforms, along with personal items such as chopsticks, sake bottles, eyeglasses, belt buckles, and buttons embossed with Imperial Japanese Navy insignia. To preserve Peleliu as a record of how the battle was experienced by soldiers on the ground, the researchers left everything on the island just as they had found it. “We had to take care not to let our minds dwell too long on what life was actually like inside the caves for the Japanese,” says Price. “It’s really quite indescribably awful and hopeless.” Even today, the caves are extremely hot, humid, airless places, pervaded with a lingering smell of burned hair. “These caves are horrible to be in even for a few minutes,” says Knecht. The stench must have been much,



A stack of 78-rpm phonograph records was melted together by the intense heat of an American flamethrower attack.

much worse during the battle, when groups of soldiers spent weeks on end cooped up alongside rotting food, human waste, and decomposing bodies. Knecht was initially surprised to find numerous used gas masks in the caves, given that gas was not

employed in the battle. He came to realize Japanese soldiers had donned the masks in an attempt to block out the noxious odors.

Traces of engagements between the Americans and Japanese are ubiquitous in the caves, says Price. “There are sprays of bullet chips across the walls, the characteristic splinter patterns from grenades and, most obviously, the flamethrower scorch marks across the walls and entrances.” In one cave in the southern ridges above the airfield, the team uncovered a particularly vivid tableau of a flamethrower attack. A gas mask was melted to the wall with bone fragments inside, suggesting it was being worn at the time of the attack. A burst canteen lay on the floor. “The water inside their canteens had turned to steam and exploded, popped like balloons from the inside,” says Knecht. “And there were human long bones driven into the ceiling and sides of the cave like big white spikes from the force of the explosions.” In the same cave, the archaeologists found a poignant reminder of the soldiers who died in the attack: a stack of melted 78-rpm phonograph records.

IN ADDITION TO attacking the Japanese in their caves, the American troops on Peleliu skirmished with them for control of the high plateaus that dotted the mountains where the fighting was most intense. At one of these locations, at the northern end of the Omleblochel Mountains, amid the thick foli-

Peleliu's Battle

In the years since the Battle of Peleliu, Palauans have largely avoided the ridges and caves where the worst fighting took place, wary of chancing upon the ubiquitous unexploded ordnance and disturbing the human remains that were left at the end of the war. But these areas were once very much a part of Palauan life. In their surveys of the battlefield, archaeologists led by Rick Knecht of the University of Aberdeen and Neil Price of Uppsala University have found Palauan pottery likely dating back many centuries near every natural cave used by the Japanese during the battle, as well as large prehistoric shell middens in sections of remote jungle. “The battle was fought on a Palauan cultural landscape,” says Knecht.

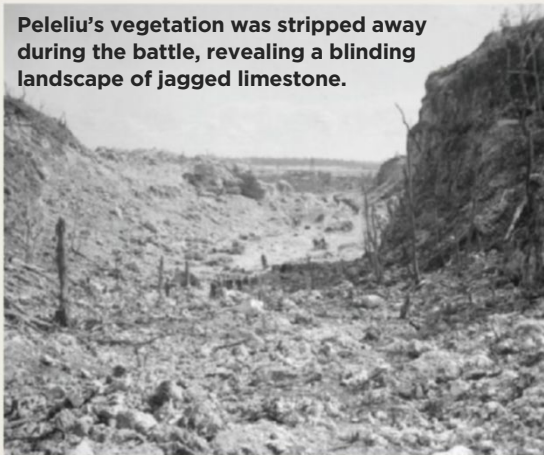
Peleliu, along with the rest of the Palauan archipelago, was settled at least 3,000 years ago by migrants from islands in Southeast Asia. Beginning in the late nineteenth century, Palau was colonized by Spain, then Germany, and, in 1914, by Japan. In preparation for war, two of Peleliu's five traditional villages were razed to make way for an airfield constructed by the Japanese in the late 1930s. The Japanese used forced Palauan labor to dig many of the caves in which they would hide during the battle, but evacuated

the island's natives before the Americans invaded. Peleliu's remaining three villages were destroyed in the battle, along with the island's previously abundant vegetation. “When people returned [in 1946], they found their island devoid of anything green,” says Sunny Ngirmang, director of Palau's Bureau of Cultural and Historical Preservation. “It was all white limestone, and you could see from one side of the island to the other—that's how bare it was.”

Arguably even more damaging for the returning islanders than the destruction of their villages and environment was the loss of almost all of the island's *olangch*—natural or constructed markers such as stones, trees, and burial sites that served as prompts to the recollection of important

memories and stories. The battle had effectively erased thousands of years of the island's history. Nonetheless, the Palauans have come to see themselves as custodians of the more recent historical record left behind by the battle. “The war was destructive to people who had no say about it whatsoever,” says Ngirmang, “but its legacy remains in the hearts of those who were affected. Their stories have been passed on from generation to generation and now it has become a part of our own history.”—D.W.

Peleliu's vegetation was stripped away during the battle, revealing a blinding landscape of jagged limestone.



age that now covers it, researchers came upon a network of 20 defensive fighting positions set up by a U.S. Army platoon. The infantrymen would normally have dug foxholes, but the stony ground made this impossible. Instead, they piled up coral rocks to form curving parapets. According to historical reports, the Americans first seized this particular plateau just over a week after the invasion. In the days that followed, they repeatedly fought over the spot with the Japanese, and it changed hands several times.

As they explored the site, the archaeologists discovered striking evidence of one of these clashes. “In one rifle pit, you’ve got this perfectly preserved American grenade placed on the parapet ready for the infantryman to pull the pin and throw it over the side of the hill,” says project member Ben Raffield of Uppsala University. “A single rifle round had been carefully placed between the pieces of stone, as if to have it on hand for reloading.” On the slope beneath another rifle pit, the team found an undetonated Japanese grenade where it may have rolled after failing to reach its target. Next to it lay a full U.S. M1 rifle magazine. “You can imagine the infantryman at the top of the escarpment trying to reload his carbine during the firefight and dropping the magazine over the side,” says Raffield. Around 30 feet away, near yet another defensive position, a pile of rifle clips sat next to an American canteen, positioned as if they had been attached to a rifleman’s belt. The canteen bears a sharp, diagonal indentation, almost certainly produced by a cut from

to reach out to his family, which was quite emotional for them,” says Raffield. “There is a whole dimension to this archaeology that you just do not get anywhere else.”

AS THE BATTLE PROCEEDED, the Americans steadily ate away at Japanese territory, twice forcing them to move their command center deeper into the ridge system in the northern part of the island. Outnumbered and surrounded, the Japanese were also at an extreme disadvantage in terms of the quantity and quality of their equipment. Knecht says that the shoddiness of much of the Japanese materiel left behind on Peleliu made a deep impression on him. “Their helmets were cast iron with really cheap liners underneath and they would just shatter when they got hit by a bullet,” he says. “The American helmets had a big steel pot and a fiberglass liner.” Japanese rifles frequently jammed and were discarded on the battlefield, while American ones were collected for reuse.

On November 24, exactly 10 weeks into the battle, the Japanese army leaders recognized that all hope was gone. In their final command center, in an area termed Death Valley by the Americans, Colonel Nakagawa and Major General Kenjiro Murai died by ritual suicide after burning their regimental colors. The archaeologists visited the site during both of their surveys. “You have to climb down into the cave, and there’s no natural light penetrating there,” says Price. “Every time we went, there

were fresh flowers. That takes quite a bit of effort, but somebody remembers.”

Before committing suicide, Nakagawa commanded the 56 surviving able-bodied Japanese soldiers to disperse into small groups and continue to attack the Americans. The Americans declared an official end to the battle on November 27, but sporadic guerilla raids went on for some time. Even after the war was over, some Japanese soldiers held out in a cave near the shore north of the airfield, occasionally harassing the Americans who staffed a garrison on the island.

The 34 men still living in the cave were finally convinced to lay down their arms after being shown let-

ters from Japan confirming that the war was over. On April 21, 1947, they became what are believed to be the last World War II troops to formally surrender anywhere in the world. The cave’s entrance was a mere slit, measuring just over three feet high and one foot wide. “Inside, it was just high enough to crouch,” says Knecht. “You’d have to squat at best.” During a ceremony commemorating the 60th anniversary of the battle, Knecht noticed



An undetonated American grenade (left) rests on a hilltop parapet. Nearby, an American canteen (right) that appears to have been slashed with a saber lies alongside a pile of rifle clips.

a saber blade during hand-to-hand combat.

On the lower slopes of a hill in the island’s far north, the archaeologists found another American canteen, with the word “CORBI” crudely inscribed on its bottom. They determined it had belonged to a marine from the Bronx named Eliodoro T. Corbi, who had been wounded on Guadalcanal but survived Peleliu and, ultimately, the war, and died in 2011. “We were able

a man in a Japanese marine forage cap sitting on his own. He approached the man, through a translator, and learned that he was Kiyokazu Tsuchida, a veteran of the Imperial Japanese Navy who was part of the group that had held out in the cave. “He told me that they stayed there all day, and at night they’d go to the dumps where the Americans threw their food away,” Knecht recalls. “He said they actually ate better from these dumps than they had during the war.”

SEVERAL HUNDRED OF the Korean and Okinawan forced laborers surrendered, but only 19 of the 11,000 Japanese troops who had been on Peleliu at the outset did so, or were captured. The rest fought on despite the dreadful odds they faced, embodying an ethos of extreme nationalist sacrifice inculcated during their training and reinforced even as the battle unfolded. The troops were encouraged to see themselves as *gyokusai*, or “shattered jewels.” The metaphor had been adopted by nineteenth-century samurai from the seventh-century Chinese *Book of Northern Qi*, which suggests that “a great man should die as a shattered jewel rather than live as an unbroken tile.”

During the battle, radio broadcasts from Japan regularly reminded the soldiers that the entire nation was counting on them. In addition, Japan’s emperor, Hirohito, personally sent 11 telegrams—more communiqués than he sent during any other World War II conflict—encouraging them to keep up the



This narrow entrance leads to a cave where several dozen Japanese soldiers hid out for more than 2 years after the end of the battle before being convinced to surrender.



A Japanese inscription traced into a concrete wall at the back of an artificially constructed cave used to store artillery wagons translates to “Place of the Loyal Samurai.”

fight. Colonel Nakagawa explained in his final radio message to the Japanese regional headquarters his decision to commit suicide: “Our sword is broken and we have run out of spears. *Sakura. Sakura.*” The final words translate to “cherry blossom,” a flower whose short, brilliant existence represents the brief but heroic life of the samurai.

In a large, artificially constructed cave near Peleliu’s airfield, the team uncovered evidence of how deeply this ethos had penetrated into the ranks of the Japanese soldiers who fought on the island. The cave, which was used to store wagons laden with artillery, had been fortified shortly before the invasion, and its walls covered with concrete. The team explored the cave as part of their first survey, and returned during the second to thoroughly document it in photographs. This required setting up a lighting system, likely fully illuminating it for the first time since the battle.

At the back of the cave, they noticed something that had eluded them during their first visit: a Japanese inscription that had been traced with a finger when the concrete was wet. They later learned that it means “Place of the Loyal Samurai.” “The inscription implies that the people who built this cave and garrisoned it during the fight knew exactly what their fate was going to be,” says Raffield. “They were going to stay and defend this place to the death.” ■

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Clockwise from top left: A carved *Spondylus* shell depicting a llama, a gold ornament decorated with a deity surrounded by solar rays, and a lapis lazuli figurine in the shape of either a llama or a puma were all found at Khoa Reef, a Tiwanaku sacred site off Lake Titicaca's Island of the Sun.



SACRED RITES OF AN EARLY

A trove of offerings discovered in Lake Titicaca shows how the Tiwanaku used

ON A CRISP WINTER DAY some 1,100 years ago, several boats circled the Island of the Sun in the middle of Lake Titicaca, in what is now Bolivia. Fragrant smoke curled up from incense burners sculpted in the shape of pumas, and llamas wearing gold leaf ornaments were sacrificed, their bodies released to the freezing depths below. These sacraments were all part of a ritual conducted by priests of the Tiwanaku culture, which emerged in the Titicaca Basin around the sixth century A.D. and endured

until the twelfth century, extending its influence across much of the southern and central Andes. The Tiwanaku, who are named for their capital city 50 miles south of the Island of Sun, left no written records, and their settlements were in ruins by the time the Spanish arrived in the sixteenth century. Thus, it has been challenging for scholars to fully appreciate the intricacies of their cultural practices and beliefs. But the recent discovery of a cache of objects at the bottom of the lake has permitted archaeologists to learn more about the role played by ceremonies such as the one conducted off the Island of the



A puma-faced incense burner is one of more than 12 such artifacts discovered at Khoa Reef.

ANDEAN EMPIRE

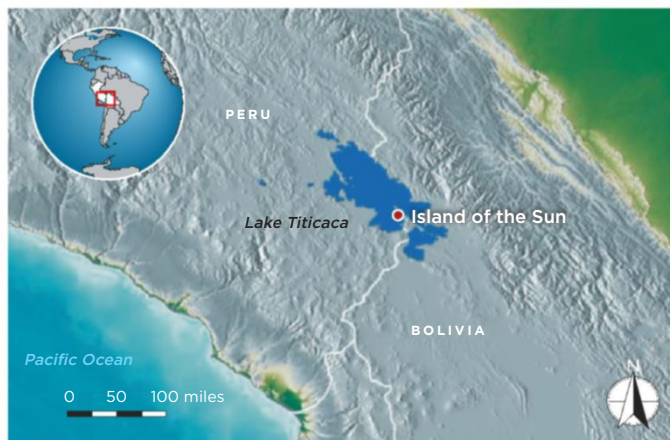
religion to control their territory *by* MARLEY BROWN

Sun during Tiwanaku's six centuries of regional dominance.

In 2013, a team of researchers led by archaeologist Christophe Delaere of the University of Oxford and the Université Libre de Bruxelles began underwater excavations along Khoa Reef, part of a submerged archipelago off the northern end of the five-square-mile island. Working in more than 15 feet of frigid water, they excavated around the base of the reef. There they uncovered a lapis lazuli figurine depicting a llama or a puma, the bones of at least four young llamas, *Spondylus* shells—including one carved into the shape of a llama—that were imported

from coastal Ecuador nearly 1,000 miles away, gold plaques shaped like llamas and pumas, and more than a dozen decorated feline-shaped ceramic incense burners. Radiocarbon dates obtained from charcoal fragments, llama bones, and the remains of lake-dwelling species dated the deposits to between the end of the seventh century and the beginning of the eleventh century.

The team was able to definitively identify the objects they found at Khoa Reef by comparing them to similar artifacts discovered at the Tiwanaku capital and at other Tiwanaku settlements across their more than 2,000 square miles of ter-



ritory. According to Delaere, there are numerous indications, including their excellent condition and arrangement along the reef's base, that the artifacts were carefully placed in the water as part of a religious ceremony. "We have been able to determine that this sort of ceremony shared basic elements across the Tiwanaku world," says Delaere. "These included an offering of ceramic vessels—in this case the feline incense burners—and of sumptuous metal objects and shells, as well as the sacrifice of juvenile llamas."

This newly discovered material provides an opportunity to document Tiwanaku artifacts in a state of preservation that is

rare at comparable sites. "All the land sites have been looted," says University of South Florida anthropologist Charles Stanish, who is working with Delaere to contextualize the Khwa Reef findings. "We find pottery broken into fragments, particularly incense burners, but all the gold and silver has been taken. Now we can deduce from these new discoveries what similar rituals at other sites would have looked like." Delaere believes that the discovery may even make it possible to piece together the ritual's timing. "The location of anchors we discovered in relation to the lake's seasonal winds suggests that the ceremonies took place at the beginning of the dry season, possibly to mark the winter solstice," he says.

Despite the fact that numerous sites clearly associated with Tiwanaku ritual behavior have been excavated over several decades, relatively little is known about their religious beliefs. They are thought to have worshipped a supernatural being, possibly a sun god emanating solar rays, who is often shown baring sharp teeth. Delaere suggests that the worship of this god may have underpinned a moral code that provided the basis for Tiwanaku leaders' claim to divine power as they expanded their territory.

SCHOLARS STILL QUESTION just how the Tiwanaku so quickly and effectively came to dominate the Titicaca Basin, but environmental conditions, and the wealth



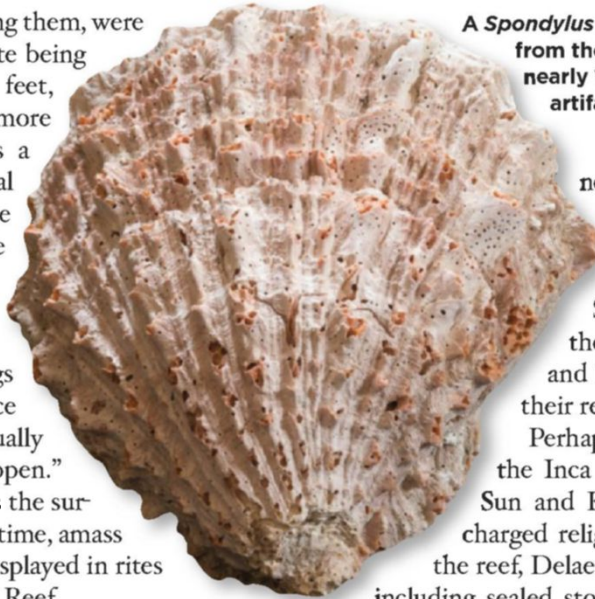
Researchers disembark from a boat used to travel to the Island of the Sun, where Tiwanaku priests held lavish religious ceremonies.

they were able to create by exploiting them, were almost surely prime factors. Despite being located at an elevation of 12,500 feet, Lake Titicaca—a rich ecosystem of more than 3,000 square miles—creates a temperate environment with seasonal rains and a shoreline highly suitable for agriculture. “You have all these resources—fish, llamas, quinoa, and potatoes,” says archaeologist José Capriles of Penn State University. “The abundance of these things makes this region the kind of place where it was inevitable that eventually something interesting would happen.” The Tiwanaku were able to harness the surplus agricultural products and, over time, amass great wealth, which they lavishly displayed in rites such as the one performed at Khoa Reef.

These rites were part of a well-choreographed circuit of religious performances and pilgrimage routes that produced a kind of Tiwanaku soft power. The Tiwanaku did not necessarily have the military might to conquer people over such a wide area outright. Instead, they drew communities into their orbit by projecting their religious authority, exhibiting their wealth, and creating a nexus of goods and cultural practices. “First, they established settlements with areas dedicated to rituals,” Stanish says, “and then they engaged in a reciprocity arrangement whereby they provided exotic goods that weren’t available locally. In turn, people were willing to give them their labor and commodities such as food and textiles.”

Delaere points out that while the Tiwanaku spread their religious beliefs throughout their territory, their sacred practices were most likely the domain of a select group of priests controlled by a centralized authority. “The Tiwanaku leadership really invented the idea of the pilgrimage destination in the central Andes,” Stanish says. The pilgrimage routes were crucial to their ability to spread their influence to the far reaches of their territory. “You can look at all the great states of the ancient world, both Western and non-Western, and they almost all do this,” says Stanish. “Pilgrimages reinforce the power of the state, and they also help people become part of that entity.”

CENTURIES AFTER THE collapse of the Tiwanaku civilization, which scholars often attribute to political fragmentation exacerbated by prolonged drought, the Inca conquered their former territory. Unlike the Tiwanaku, however, there is little doubt about the military might of the Inca, or of their rulers’ ability to administer a vast expanse of territory from their capital, Cuzco. At its height, the Inca Empire, which was described by Spanish explorers, covered



A *Spondylus* shell imported to the Titicaca Basin from the warmer waters of coastal Ecuador nearly 1,000 miles away was part of the artifact cache at Khoa Reef.

nearly 400,000 square miles, ranging from what is now northern Ecuador to southern Chile. Because their empire spanned such a huge area, Stanish says, the Inca understood the importance of harnessing ideology and belief to control the people within their realm.

Perhaps influenced by local oral history, the Inca also began using the Island of the Sun and Khoa Reef as places for politically charged religious performances. In one area of the reef, Delaere and his team uncovered artifacts, including sealed stone offering boxes filled with stone figurines, dating to the period during which the Titicaca Basin was under Inca control. These artifacts were separated from the Tiwanaku material by more than a foot of sediment containing no artifacts. This layer represents the roughly 300 years between the collapse of the Tiwanaku state and the time the Inca arrived.

Inca rulers were well aware that the region they had conquered had a sacred history to those who had lived there. “The Inca very carefully chose to build temples in places that already had spiritual significance,” says Stanish. “Even several hundred years after the last Tiwanaku ritual was performed there, Inca emperors would come from Cuzco to Tiwanaku—and we know that they would stop on the Island of the Sun.” ■

Marley Brown is associate editor at *ARCHAEOLOGY*.



A gold plaque in the shape of either a puma or a llama is among the offerings given by Tiwanaku priests during the ceremonies performed off the Island of the Sun.

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A large circular Neolithic henge (center) is one of three such monuments that were discovered during construction on England's A14 roadway. The markings to its right are the faintly visible outlines of Anglo-Saxon buildings constructed more than 3,000 years later.

LETTER FROM ENGLAND

BUILDING A ROAD THROUGH HISTORY

6,000 years of life on the Cambridgeshire landscape has been revealed by a massive infrastructure project

by **JASON URBANUS**

Outside the village of Brampton, Cambridgeshire, a handful of archaeologists huddle with a small group of local volunteers. Some of these professionals have been working here for two years and are all that remain of one of the largest archaeological teams ever assembled in Britain. They are in the final stages of excavating a small medieval hamlet

called Houghton and have invited members of the public to join them for their final few weeks. Houghton was once a bustling little settlement, its dozen or so properties arranged around a broad central track. The scattered postholes and pits from this long-forgotten village are emblematic of the entire landscape, which has seen waves of people come and go over

the past 6,000 years. Each has left an imprint upon the terrain.

Dump trucks, bulldozers, and other heavy equipment rattle away behind the archaeologists, kicking up the dust that seems to perpetually hover above the mostly flat farmland that forms the backdrop to this once bucolic countryside. As it happens, the 800-year-old settlement is in the

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middle of a construction zone, a huge infrastructure project to upgrade and extend a 21-mile stretch of the A14 roadway between the towns of Cambridge and Huntingdon. Houghton is one of the final sites that must be cleared before the archaeologists' work is complete and they surrender this tract of land to the advancing army of road builders.

England is so archaeologically rich that hardly any construction project takes place without encountering at least some evidence of its deep historical past. But, unlike what they encounter during most preconstruction or rescue excavations, here the archaeologists aren't investigating a single site from a single time period, but dozens of sites spanning nearly the entirety of English history. According to Highways England's Steve Sherlock, archaeology manager for the A14 excavations, the dig's scale is unprecedented. "It's the biggest road archaeological project in the country and the largest project of this nature that has ever

been undertaken here," he says.

Since it would be nearly impossible to conduct fieldwork along all of the A14 construction corridor, archaeologists conducted intensive preliminary geophysical work, field assessments, and exploratory excavations that included an astounding 17 miles of test trenches to see where potential sites might be located. They finally homed in on a targeted area of 1.4 square miles to fully excavate, an expanse slightly larger than New York's Central Park. Ultimately, this epic endeavor would require a team of more than 250 archaeologists.

England's long history is marked by a series of transformative events. Some of these are hard to pinpoint, such as the adoption of bronze or iron technology. Others are more easily recognizable, such as the Roman, Anglo-Saxon, and Norman invasions. All of this history played out on the Cambridgeshire countryside, creating a giant palimpsest that has been built

upon, erased, and built upon again, over a millennia-long cycle. As the roadwork has slowly cut a swath through the county, it has become possible to imagine how the landscape might have looked at different periods, almost like turning the pages of a flipbook. "The preliminary work suggested there was a lot here," Sherlock says, "but there have been tremendously exciting surprises along the way."

In all, the A14 team discovered three Neolithic henges, 300 burials in seven cemeteries, dozens of small Iron Age and Roman farmsteads, 40 Roman pottery kilns, three Anglo-Saxon villages, and the abandoned medieval hamlet of Houghton. They have amassed seven tons of pottery, five tons of animal bones, and 140 tons of environmental soil samples. Among the 8,000 excavated artifacts are Bronze Age stone tools, pieces of Iron Age weaving equipment, and, from the Roman era, copper brooches, jet jewelry, a soldier's belt buckle, and even a fragment of a

bone tablet with cursive Latin writing. Taken all together, it is an almost incomprehensibly large archaeological haul. “It’s kind of blown our minds,” says Emma Jeffery, senior archaeologist at MOLA Headland Infrastructure, a consortium formed by Museum of London Archaeology (MOLA) and the contract firm Headland Archaeology, which is responsible for the A14 project. “Our sense of scale, and everything else, has been completely warped by it all.”

One of the many questions the A14 archaeologists are investigating is why this particular strip of land attracted so many different groups of people

ing. But along the A14 corridor, there are pockets of land that contain gravel substrata, which drain more easily, and thus are more suitable for habitation. “The geology is fundamental, really,” explains Sherlock. “You could farm or raise livestock in the wetter areas, but people always chose the places where there are gravels and thus drier land to live on.”



A copper alloy brooch (above), an enameled copper alloy brooch (below), and a carved jet pendant (left) depicting the head of Medusa are among the finely crafted Roman objects found by the A14 archaeologists.



over such a long period of time. The key draw may have been the natural trade and communication routes that crisscross the region, in particular the River Great Ouse, which snakes its way across the A14’s path, linking this inland area with the North Sea. “I think it has a lot to do with the transport networks,” says Jeffery. “You’ve got the Great Ouse, as well as other tracks and routes through the landscape that I think helped.” Sections of the new A14 partially follow the route of a Roman road that once connected the ancient towns of Godmanchester and Cambridge.

Sherlock suggests that the region’s geology may have been an even more important enticement to settlers. Much of Cambridgeshire is flat and its lower-lying areas are prone to flood-

When archaeologists began clearing the A14’s proposed route, it became readily apparent that the Roman imprint on the area was profound—but this was to be expected. The emperor Claudius invaded Britain in the mid-first century A.D., and for the next 400 years, until the end of the empire, the Romans radically transformed the island by building roads, towns, and military outposts as part of an all-encompassing imperial administrative system. Finding the Romans anywhere in Britain is not dif-

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A series of rectangular enclosures comprise a Roman-era supply depot. This complex was connected to several outlying farmsteads through a road network that facilitated the transfer of agricultural products to this central distribution center.

ficult, especially when digging along the course of a Roman road. But, given the extent of the excavations, researchers now have a much more complete view of how this area was organized during the period.

Travelers following that Roman road from Cambridge to Godmanchester during the first few centuries A.D. would have recognized the telltale signs of the Roman economic, industrial, and administrative machine at work. Along the journey, they would have seen large villas and small farms scattered across the landscape, as well as an agricultural supply depot with an artificial pond. A network of small trackways linked

the depot to outlying satellite farms. Closer to Huntingdon, near the western banks of the Great Ouse, they might have passed one of the dozens of Roman pottery kilns, evidence of the area's ceramics industry, which was enabled by the river's abundant clay deposits. According to Sherlock, the area had all the necessary resources

to support a booming pottery trade. "You've got your clay, you've got your Roman road, you've got the Great Ouse, and you have Godmanchester," he says. "The material, the transport links, and the demand are all together."

As archaeologists moved across the landscape over the past two years, they also exposed an unexpected history more than 4,000 years older than the Romans. Sherlock and his team now know that the earliest evidence of human occupation in this



A small bone fragment used as a writing tablet bears a Latin text that may include someone's name written in a cursive hand.

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An archaeologist (above) excavates a Roman pottery kiln. It is one of approximately 40 such kilns that have been identified during the A14 project. A locally produced Roman ceramic flask (right) bears a simple painted decoration.

part of Cambridgeshire dates to the Neolithic period (4000–2500 B.C.), one of the most revolutionary eras in England's history. As farming became widespread for the first time, forests began to disappear. People all across Britain began to construct the island's first large-scale monuments—A14 archaeologists have discovered three circular earthen henges, the largest of which measures 165 feet across. Most scholars believe that this type of henge was used for ritual gatherings and ceremonies, suggesting that this area may have had sacred meaning to those who lived here as long as 6,000 years ago. Even though the sacred connotations these enigmatic enclosures once possessed may not have carried over to subsequent eras, they continued to be respected landmarks. "These monuments survived as large physical features from the Neolithic through

the Bronze Age, through the Roman era, and were still visible in the Anglo-Saxon period," says Sherlock. Buildings that were constructed centuries, or even millennia, later seem to have been carefully arranged around the henges, as if not to disturb them. "They were probably still being used in some sort of way, maybe as a place that at certain times of the year you would come and meet and celebrate," Sherlock adds.

For the next 4,000 years, technological advances marked the advent of new epochs, including the Bronze Age (2500–800 B.C.) and the Iron Age (800 B.C.–A.D. 43). During these

periods, too, Cambridgeshire's inhabitants reshaped their landscape. The A14 archaeologists have found Bronze Age fields demarcated by large ditches that served as territorial boundaries. The researchers have also unearthed a large Bronze Age funerary barrow containing 65 burials near the Great Ouse. Another barrow, containing 50 more burials, was identified a few miles away. In

total, 150 Bronze Age human burials have been found scattered throughout the project's purview.

The team has located as many as 15 farmsteads and settlement sites dating to the Iron Age.

Among these, they have unearthed evidence of daily life, including weaving combs, loom weights, agricultural tools, and coins. Microscopic soil analysis has indicated that Iron Age farmers were cultivating spelt and barley in the surrounding fields. And there is even evidence, in the form of charred and fermented grains, that the farmers were brewing beer, the earliest indication of this practice in Britain.

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(continued from page 60)

While the discoveries of sites dating to the Neolithic, Bronze, Iron, and Roman Ages were exciting, as they helped reimagine the first 4,500 years of human history here, archaeologists were perhaps most surprised by the evidence of post-Roman life in this part of Cambridgeshire. After the collapse of Roman Britain in the mid-fifth century A.D., a new era was ushered in when groups of Germanic Angles, Saxons, and Jutes from northern Europe invaded the island. Once again, the English landscape was transformed as many Roman settlements and institutions, and even elements of the remaining infrastructure broke down and were abandoned. Very little is known about this period in Cambridgeshire because there is a paucity of archaeological evidence, but the A14 construction is beginning to change that. “Across the whole project the Saxon discoveries were the most remarkable of all,” Jeffery says. “We expected the Roman settlements, the Iron Age settlements, and everything else, because they have been found



An Iron Age comb fashioned from deer antler may have been used to beat down the horizontal threads on a loom during the production of textiles.

elsewhere across Cambridgeshire. We have known about them through geophysics and crop marks. But the number of Saxon buildings, and the intensity of Saxon activity, really was unexpected.”

One of the reasons Anglo-Saxon settlements are rarely excavated is that many of them have been continuously occupied, and remain so today, render-



Three views of a Neolithic flint axhead dating to between 4000 and 2500 B.C., which is one of the oldest artifacts discovered along the A14

ing them inaccessible. “We might find a couple of buildings if we are lucky,” explains Jeffery, “but we don’t get them too often because they are under modern villages and we just can’t reach them.” Even when Anglo-Saxon sites

are located in more rural areas, they can be difficult to identify. Since they were predominantly constructed of timber and other perishable materials, Anglo-Saxon buildings leave very little archaeological signature once they are abandoned and the materials decompose. “The problem with these structures is that they don’t necessarily show up in the geophysics because what remains

A well-preserved Iron Age gold coin minted in the mid-first century B.C. depicts a stylized horse.



of them is so small,” Sherlock says. “Ephemeral things, such as a line of postholes, may not appear in a magnetometer survey, so you don’t find them until you strip large areas.”

Stripping large areas is precisely what the A14 roadwork entails. As a result, at least three Anglo-Saxon settlements dating to between the fifth and tenth centuries have been revealed. The largest once had as many as 50 buildings, including houses and workshops spread across 15 acres. It is one of the big-

gest sites of its kind ever found in the region. The Anglo-Saxon period in Britain is often referred to as the Dark Ages because it is perceived to have lacked culture, especially when compared to the preceding Roman period. But for Sherlock, some of the new



This bone flute carved from the leg of a deer is a rare example of an Anglo-Saxon musical instrument. Only 30 such artifacts have been found in Europe.

evidence tells a much different tale. For example, a finely crafted Anglo-Saxon bone flute—like musical instrument, one of only about 30 that have ever been found in Europe, speaks to a more refined population. “These weren’t primitive people living here,” says Sherlock. “They were literate and had music and art.”

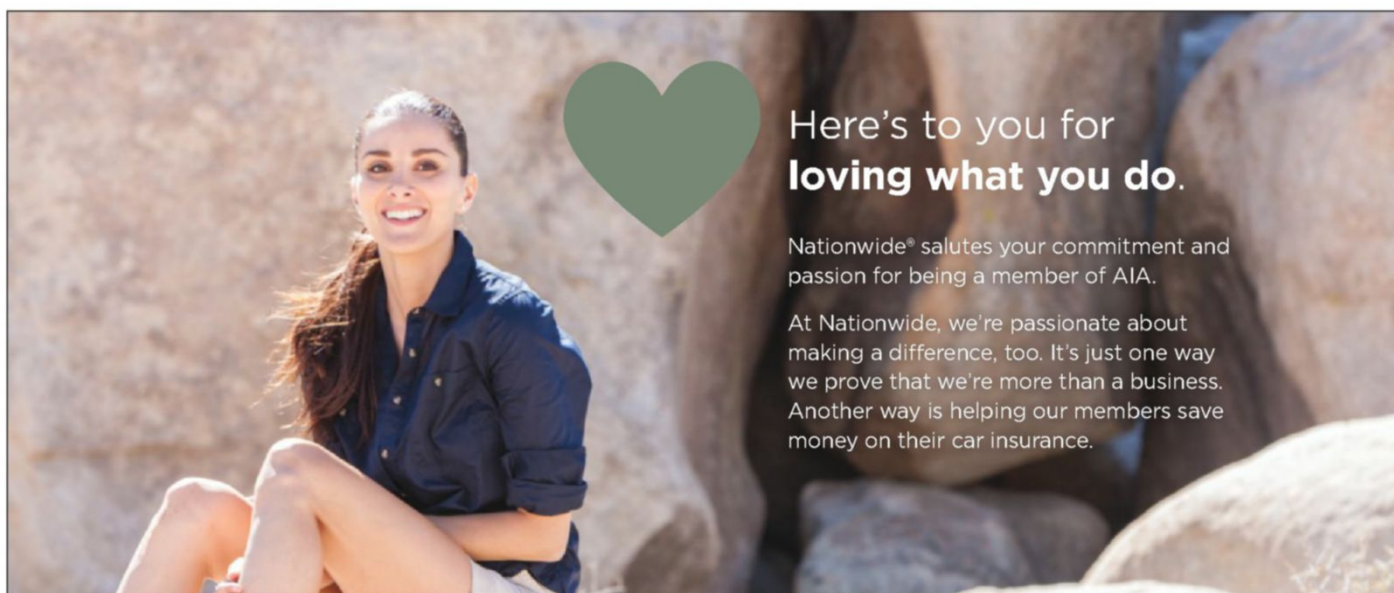
Directly adjacent to one of the newly uncovered Anglo-Saxon sites is the abandoned medieval village of Houghton. Although the town’s name appears on old maps, no physical traces of its existence had previ-

ously been found. Since it is not directly in the path of the roadway, and all other essential work had been completed, archaeologists were allowed to investigate the site at a less hurried pace.

The abandonment of towns and villages in England during the medieval period was not uncommon, especially in the late fourteenth century when the Black Plague ravaged the country, killing as much as 60 percent of the population. Yet Houghton was deserted decades before the plague’s arrival. “We were particularly excited because it’s a slightly earlier village, so it’s not like the deserted medieval villages that

you find elsewhere,” Jeffery says. She has learned that the fate of Houghton’s residents was determined by a particular set of circumstances. They were not, in fact, victims of disease but, instead, of cruel medieval politics.

The village’s only road, which excavators have dubbed “Houghton Lane,” ran through its center and connected villagers to a wooded area known as Brampton Wood. Brampton Wood was vital to Houghton’s residents. “The villagers would have used the forest for food, for fuel, and for other resources,” says Jeffery. But sometime after Henry II (r. 1154–1189) ascended the throne of England, the king claimed the whole county of Huntingdonshire, of which Brampton Wood was part, as his exclusive hunting grounds. This essentially prohibited Houghton’s villagers from accessing and using the



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Beneath a field outside the village of Brampton, Cambridgeshire, archaeologists have recently excavated the footprint of an Anglo-Saxon settlement and the remains of the abandoned medieval village of Houghton.

forest upon which they had become dependent. “At that point the woods were basically fenced off, so people lost their economic viability,” Jeffery says. Suddenly barred from the land that had sustained them, the villagers had no choice but to pack up and move elsewhere.

Although the team has uncovered most of the village’s footprint, there does not appear to have been a church or even a manor house. This may indicate that there were no church officials or local nobles who might have been able to speak up on the villagers’

behalf and resist the crown’s declaration. “There was nobody here to say, ‘No, I’m not giving you this bit of land,’” Sherlock says. “It’s just a small hamlet, so the king could dispossess the people a lot more easily and move them on.”

The A14 excavations have elucidated the ebb and flow of thousands of years of settlement in this small stretch of southeastern England. They have shown that people have come and gone, whether through natural circumstances, because another group usurped their territory, or because they were forced from their land by the

sovereign. Soon, all traces of this massive archaeological undertaking will be gone—artifacts, monuments, houses, tombs, streets, and entire settlements will have been removed from the ground, reburied, or paved over. In the coming months and years, millions of people will speed through this countryside along the newly built A14, most of them likely oblivious to the 6,000 years of human history just outside their car windows. ■

Jason Urbanus *is a contributing editor at* **ARCHAEOLOGY**.



CELEBRATE INTERNATIONAL ARCHAEOLOGY DAY ON OCTOBER 19, 2019



This year's International Archaeology Day (IAD) will take place on October 19, 2019. IAD is a global celebration of archaeology and the thrill of discovery, held annually on the third Saturday of October. This will be the ninth Archaeology Day since the AIA first called on the archaeological

community to help share the wonder and importance of archaeology through educational and outreach activities. AIA Societies and collaborating organizations all over the world host events throughout October, making archaeology accessible to as many people as possible.

The inaugural Archaeology Day saw almost 15,000 attendees, and each year the number of collaborating organizations, events, and participants has grown. Last year's festivities included over 1,000 events

attended by more than 200,000 people worldwide. Be sure to mark your calendars so you don't miss out. To learn how to participate, please visit archaeologyday.org. While you're there, be sure to check out the IAD blog to find out more about specific events around the world.

AIA ADVOCACY

An important component of the AIA's mission is to advocate for the world's archaeological heritage. Recently, the AIA submitted letters to the State Department's Cultural Property Advisory Committee to support requests made by the Republic of Chile and the Hashemite Kingdom of Jordan for U.S. import restrictions on archaeological materials from these countries. It is the position of the AIA that the archaeological heritage within these nations is at risk, that both countries have demonstrated that they are working to protect this heritage, and that this heritage and the efforts of these nations benefit the international community. To learn more, please visit archaeological.org/news/aianews/32388.

The AIA's Site Preservation Program counts projects in both Chile and Jordan among its grant recipients. We have made awards to Easter Island and Nama in Chile and to Umm el-Jimal in Jordan. We invite you to learn more about these and other Site Preservation projects at archaeological.org/sitepreservation/projects.

AIA PRESIDENT JODI MAGNESS ELECTED TO AMERICAN ACADEMY OF ARTS AND SCIENCES



We are delighted to announce that AIA President Jodi Magness was elected to the American Academy of Arts and Sciences (AAAS). Founded in 1780, the AAAS honors excellence, and counts among its members leaders from across all fields of human endeavor. As outlined in the Academy's charter, members come together "to cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people." Magness was elected to the AAAS in the category of Humanities and Arts—Philosophy and Religious Studies. We offer our most sincere congratulations to Jodi for this well-deserved honor.



DISPATCHES

FROM THE AIA

EXCAVATE • EDUCATE • ADVOCATE

GET READY FOR THE AIA ANNUAL MEETING

The 121st Joint Annual Meeting of the AIA and the Society for Classical Studies will take place January 2–5, 2020, in Washington, D.C., at the Marriot Marquis Washington D.C. The annual gathering of more than 2,000 people is an opportunity for scholars, students, archaeology enthusiasts, classicists, and anyone interested in

the ancient past to learn about the latest research and findings in the field and the laboratory. The meeting is open to AIA members and nonmembers alike. Meeting registration and hotel reservation details will be posted to the AIA website in late summer. To learn more, please visit archaeological.org/annualmeeting.

AIA SITE PRESERVATION GRANT NEWS

While work supported by the latest AIA Site Preservation Grant gets underway at the Royal Pyramids of Nuri, Sudan, we have some updates from previous grant recipients.

Thimlich Ohinga, Kenya

In 2011, an AIA Site Preservation Grant was awarded to a community-based archaeological conservation project at the 500-year-old site of Thimlich Ohinga in Kenya, directed by Edward M. Luby of San Francisco State University and Isaya Onjala of the National Museums of Kenya. The site was used in various ways, including both as a fortification and as an urban complex. In June 2018, Thimlich Ohinga was added to the list of UNESCO World Heritage sites, and a ceremony was held at the National

Museums of Kenya headquarters in Nairobi to commemorate the inscription. On April 18, 2019, celebrations were held at Thimlich Ohinga to coincide with World Heritage Day, also known as International Day for Monuments and Sites.

Easter Island, Chile

A 2009 AIA Site Preservation Grant supported the Easter Island Statue Project (EISP), directed by UCLA archaeologist Jo Anne Van Tilburg and codirected by Cristián Arévalo Pakarati. Among other project goals, the team focused on conservation of the monolithic sculptures, known as moai, on Easter Island (Rapa Nui), Chile. The EISP and Van Tilburg were featured in a recent segment that aired on the CBS television

show *60 Minutes*.

The presentation highlighted the nature and significance of the statues and also discussed the issues and challenges of preserving the monuments, which are affected by environmental factors such as the sun, wind, and rain. Increased tourism also poses a threat to the



Easter Island, Chile

statues; more than 120,000 people visited the island in 2018.

Each year the AIA offers grants and awards to projects that focus on preserving cultural heritage around the world. To date, 33 projects have received funding from the AIA. You can read more about these projects at archaeological.org/sitepreservation/projects. Like all of our programs, the Site Preservation Program is supported by gifts from our generous donors, members, and readers. If you are interested in making a gift to the AIA, please go to archaeological.org/giving. Help preserve the past for the future.



Thimlich Ohinga, Kenya



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Ardhanarishvara in The Bronze
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Annapurna Garimella

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Stephen Harvey

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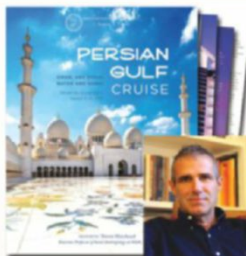
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Trevor Marchand January 2-12, 2020

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**Madagascar to Mauritius: Islands of
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Bronze Age Spain was a dicey place to buy jewelry. At this time, trade networks that spanned all of Europe carried valuable raw materials across the continent. One of these materials was amber, or fossilized tree resin, which had long been prized for its color and rarity, and was used in high-status ornaments for both the living and the dead. Amber from the Baltic, and later Sicily, as well as ivory from Asia and Africa, jade from the Alps, and the mineral cinnabar became ever more prized commodities. At the continent's western edge, Spain was connected to long-distance trade routes, and thus to a plentiful supply of these luxury items, by virtue of its access to the Atlantic Ocean and Mediterranean Sea, says archaeologist Carlos Odriozola of the University of Seville. It was also, therefore, a prime target for unscrupulous traders looking for an easy mark.

Odriozola has analyzed grave goods from burials in two different locations—one an artificial cave called La Molina in Seville, and the other the Cove of the Giant near Barcelona. He has found that, alongside such precious items as ivory, there were also beads that, at first glance, appear to be amber, but which actually turn out to be shells and seeds covered in pine resin to make them resemble the gemstone. “This is the first time in Western Europe we have evidence of imitation and fakery,” says Odriozola. He wonders whether these were examples of traders deliberately deceiving consumers, whether community leaders didn’t have the resources to purchase the real thing, or whether a shortage of amber led to the development of techniques for creating faux amber. “The quest for power and wealth are consistent behaviors for humankind across time, and it’s easy to imagine ancient middlemen cheating people to acquire them,” Odriozola says. “If they fooled us, a team of well-trained archaeologists, I’m sure they fooled their buyers in the past, too.”



WHAT IS IT
Beads
CULTURE
Bronze Age
DATE
3000–1400 B.C.
MATERIAL
Mollusk shells, seeds, pine resin, cinnabar
FOUND
Cove of the Giant SPAIN La Molina Cave
DIMENSIONS
Ranging from 0.37 to 0.53 inches diameter



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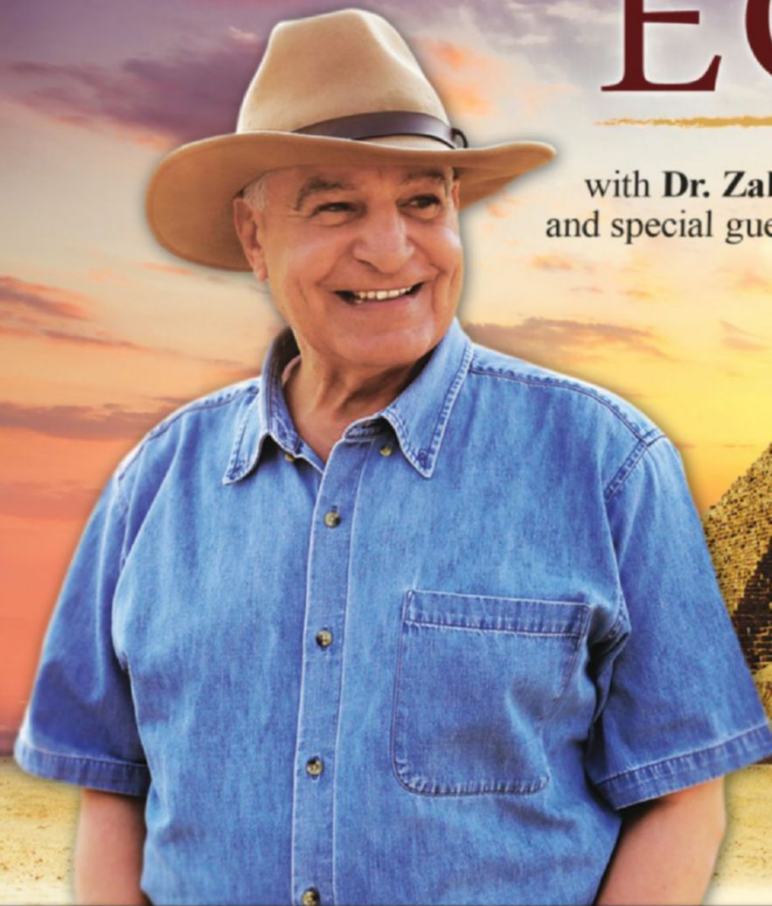
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